SIBLING RELATIONSHIPS

PSYCHOLOGICAL AND EDUCATIONAL IMPLICATIONS

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Commonwealth Publishers
NEW DELHI-110002
(INDIA)

First Edition: 1989

ISBN Number 81-900077-2-6

Published by Commonwealth Publishers
4378/B, Gali Murarilal, Ansari, road
Darya Ganj—Delhi
Printed at
Taruna Enterprises Anup market
Maujpur—Delhi 110053

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Preface

The role of the family as an informal agency for an all round development of the child's personality has been universally recognised. The basic postulate of this study is that siblings (taken in the narrow sense of brothers-sisters of the same parents) exercise no less important influence on the healthy development of a child's personal-social status than his/her parents because, exception case of the only child, they are inevitable factors in the family situation where the child spends his/her most impressionable years.

The main focus of the present study was no inter-sibling relationship and its effect on scholastic and personal-social development of children. The earlier researches have dealt with the factors of age, sex and birth-order difference of siblings in relation to their personality development without any concern for sibling relationship. In the present research the factors of age, sex and birth-order of siblings and the number of siblings in a family, which are congenital factors, and socio-economic, cultural and educational level of the family, which are sociological factors, were taken as independent variables and their effect on inter-sibling relationship (taken as a dependent variable) was studied. The effect of sibling relationship in-turn on their scholastic success was also judged.

As regards inter-sibling relationships, a measure of cordiality between siblings as indicated by cordiality index based on 'fact,' 'surface' and 'depth' measure is a humble contribution made by the researcher which is open for critical analysis by the subsequent researches.

Any topic examined microscopically tends to acquire numerous dimensions and in research one can always bite more than one can chew. The researcher has tackled the subject from a well defined angle which covers only a part of the field that awaits further exploration by other later researches. The researcher trusts that her limited investigations revealing some so far unexplored configuration in the Indian child's life will be of interest to both educationists, parents and social workers and lead to ameliorative action with better insight.

The author very much personally beholden to the administrations of various secondary schools she canvassed for collecting the data for this study. Her particular gratitude is due to her guide Dr. (Miss) Sunitee Dutt and Prof. M. Verma whose unfailing encouragement and guidance were of constant source of insight and inspiration to her in the conduct of this research Study. She is also thankful to Prof. R.N. Mehrotra, Head of the Department of Education of the University of Delhi, for his constant encouragement during her work. She also would like to thank her other numerous helpers and friends for their help in one way or the other during the course of this work.

Finally, the researcher is thankful to her near and dear ones, especially her husband, Raj, for the encouragement and moral support which have sustained her during the difficult periods.

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Background and Scope of the Study

1.1 SIBLING AND ITS INTERPRETATIONS IN DIFFERENT DISCIPLINES

In Oxford Dictionary (80), the word 'sibling' is defined as a brother or a sister more explicitly as one of two or more children having one or both parents in common. While this is the most commonly used definition, the term has been used in different disciplines of Social Sciences with more involved meaning than the above.

In the Dictionary of Social Sciences (33), it is defined as a 'a brother or a sister'. A male sibling is a brother and a female sibling is a sister. Where one sibling has only one parent in common with another sibling, each is called a half-sibling. Sibling is always a relational term but the relationship is not always restricted to blood brother and sister or even to blood relations. The relationship may be extended to blood relatives of the same generation or it may be purely social one resulting from marriage or adoption.

The word 'sibling' actually traces its origin from the word 'sib'. In the Dictionary of Social Sciences (33), 'sib' is defined

'a social group in which all of the members recognise a kinship bond based upon the assumption of common descent in the matrilineal or patrilineal line, to the exclusion of the other line, and in which the demonstration of genealogical relationship, between and among the various members is not considered necessary or pertinent'.

In this definition the 'bond of kinship' refers to the blood relationship and the similarity or alliance in character; and 'common descent' is described as 'lineage' meaning the process in which the transmission of qualities, properties and privileges takes place by inheritance from a common source, nemaly the mother's line or father's line.

The term 'sibling' has been defined in different disciplines, like Biological Sciences, Anthropology, Psychology and Education, with some what different meanings. It would not only be of interest to see what these definitions are along with the similarities and dissimilarities that exit between and among these, but also it would enable the investigator to discern which definition could be suitably applicable in the present study.

In Biological Sciences the word 'sibling' is often used in its shorter form 'sib', and it designates a brother or a sister. Full siblings are persons of either sex who have the same father and mother. Two persons who are children of the same mother and different fathers or of the same father but different mother are half-siblings. Radoliffe Brown (66), in his study of kinship system, has explained that a group of siblings is constituted by the sons and daughters of a man and his wife in a monogamous society, or of a man and his wives in (polygamy), or of a woman and her husbands in polyandrous community.

In Anthropology, also, the word 'sibling' has been drawn from the basic word 'sib', where this term principally occurs in the studies of kinship; and it implies all persons descended from a single ancestor in either male or female line according to system of reckoning kinship in a given society. An anthroplogiest, Linton (52), in his study of mankind, says that in an agnatic consanguine (*i.e.*, the one relating to descendents from

male line from same male ancestor) family system, parallel cousins may be classed as siblings.

Earlier in 1920 an American Anthropologist, Lowie (53), in his vast study of structure and evolution of man dealing with societies and customs, was responsible for introducing the word 'sib' to anthropologists. He equates 'sib' with the word 'clan' used by British anthropologists and defines it as a 'unilateral kinship group'. The word 'clan' implies a unilateral descent group, either patrilineal (*i.e.*, in the father's line) or a matrilineal (*i.e.*, in the mother's line). It was originally used to refer to teutonic (germanic) and scottish society *i e.*, a group with a common ancestor. According to Lowie, sib organisation is characterized by the following:

(i) In sib-organization the immediate or nuclear family is bilateral, but beyond it kinship is traced through either parent to the total neglect of the other.

(ii) The transmission of property rignts and the mode of residence after marriage are the most effective means of establishing the principle of unilateral descent.

(iii) The sib is extremely variable in its association; it may be linked with plants and animals.

(iv) Sibmates of the same generation usually call one another siblings. Thus marriage between sibmates is considered incestuous'.

As against the above in 1949, Murdock (59), another American anthropologist, as a consequence of his extensive exploration of patterns of kinship in which he used data from 250 societies, expands the terminology for associated patterns and practices and recognises that not all unilatieral kinship groups are properly sibs. According to him,

'When the members of a consanguineal kingroup (*i.e.*, a group of persons having the same blood) acknowledge a traditional bond of common descent in the maternal or paternal line, but are udable to trace the actual genealogical connections between individuals, the group is called sib'.

He further says that some unilinear societies lack true sibs; they possess only lineages. A sib normally includes several lineages. Groups intermediate between sibs and lineages which are found in some societies, may be called 'sub-sibs'.

In the Dictionary of Psychoanalytical Terms (23), the term sibling refers to its shorter form 'sib' where it means one of two-or more off-springs of either sex from the same mother or the same father or when both parents are same. Wide usage has been made of this word by psychologists through the expression of 'sibling rivalary', meaning competitive spirit among siblings.

In the Dictionary of Education (32), the term is defined as one of the several off-springs of the same two parents, but not a member of such multiple birth-groups as twins or triplets.

It is, thus, seen that while the basic interpretation of the term 'sibling', having both parents in common, is implicit in the definitions adopted in different disciplines mentioned above, extensions and generalizations have been particularly made to this interpretation in the disciplines of Biological Sciences and Anthropology to include off-springs in polygamous and polyandrous societies and the members of consanguineal family system.

In the context of the present study, it was proposed to use the term to mean 'brothers and sisters having common parents.'

1.2 SIBLING RELATIONSHIPS

'Sibling' is always used as a relational term, and it is an important constituent in the study of family relationships. The relationships in a family exist between parents, between parents and children, and between the among children. Out of these, the relationships between individual parents and those between and among children are of horizontal type *i.e.* one based on attitude of intimacy or degree of we-feeling, while the relationships between parents and children are of vertical type *i.e.* one based on sense of difference between individuals and groups on account of their status. The possible relationships in a nuclear

family system are elaborated by the researcher In Figure 1. (page 4).

Family is more than a structure. There is always an interaction among the family members and the relationships among family members are built up through these interactions. The relationships among the individuals in a group or the position of an individual in a group can be studied by an effective and widely used method of sociometry. Sociometric studies show that the relationships among the individuals of a group can be of following types:

Mutual positive; *i.e.* when both individual reciprocate positively with each other.

Mutual negative; *i.e.* when both individuals avoid any association or communication between each other.

Mixed ; *i.e.* when one individual reacts positively while the ohter reacts negatively.

One way ; *i.e.* when one individual shows a positive or negative attitude while the other does not have any reaction towards it.

These, thus, identify what are known as individuals positions within a group: such as the populars, isolates, neglectees, or rejectees etc. The sociometric studies also reveal group structure. For example, its degree of cohesiveness, can be studied by finding out formation of cliques and cleavages.

Sibling relationships, as being one of the sets of relationships in a family, can also be of the types mentioned above.

Sibling relationships can be studied through social interaction because the relationships are buiit up through social interaction. The term 'social interaction' is defined in the Dictionary of Sociology referred from Brown (13) as:

'The social process when analysed from the standpoint of inter-stimulation and responses of personalities and groups.'

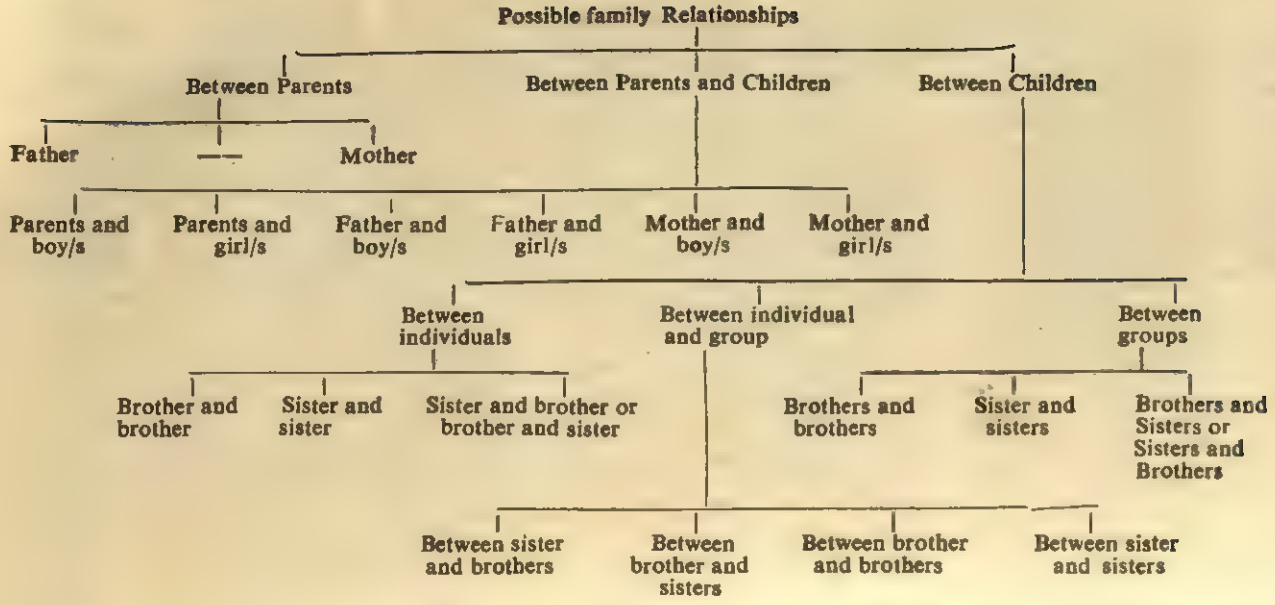


Fig. 1.1. Possible Family Relationships in a Nuclear Family System

Brown (13) has presented a detailed study of social interaction which is generally accepted. According to this, the social interaction has been classified as presented by the researcher in Figure 1.2 (page 7). The classification is made essentially on three bases. These are as follows:

(i) in terms of social process.

(ii) in terms of degree of intimacy, and

(iii) in terms of numbers.

(i) The social process includes three aspects: adjustment, opposition and cooperation. Social adjustment refers to a process through which the relationships between individuals, groups and various cultural elements are established on a mutually satisfactory basis. The adjustment takes on the character of adaptation in the early infancy. Adaptation is described as both negative and positive. The negative adaptation means the ways in which early behaviour patterns of a child are discontinued. The positive adaptation refers to certain stimuli which elicit responses from a child which are not seen earlier. Two important aspects derived from this form of social adjustment are 'imitation' and 'attitude' adopted by a child in a family.

Opposition is an attitude which comes as a result of economic, cultural, age, urban, rural and religious differences. It includes competition and conflict and can be assumed to exist: within an individual, between two individuals, between individual and group, and between or among groups.

Cooperation is a spirit and can be distinguished as of two different kinds: voluntary and coerced. In voluntary cooperation the two individuals or groups hold the same purpose and mutually assist each other. Coerced cooperation is one in which the purposes are not shared equally by the individuals or groups but, for fear of punishment, they join activities with each other.

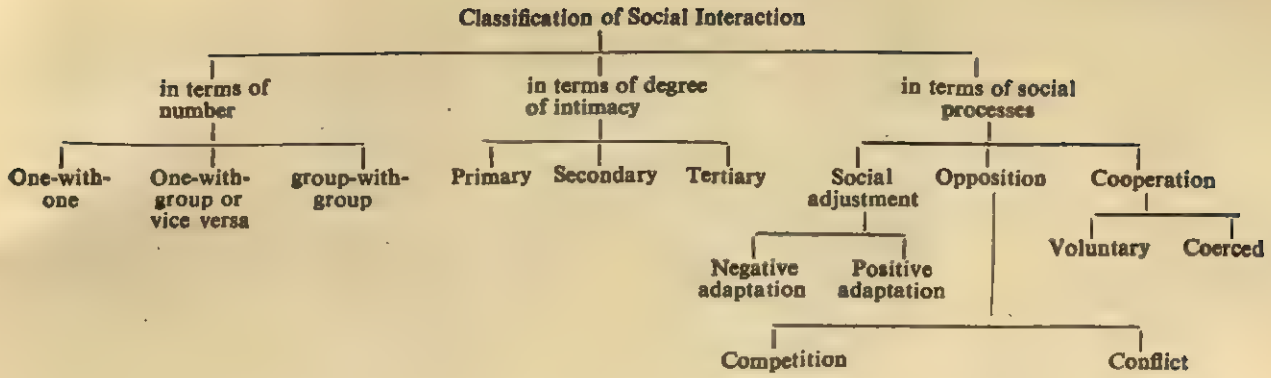


Fig. 1.2. Classification of Social Interaction According to Brown (1946)

(ii) The degree of intimacy refers to a we-feeling which an individual acquires for another person or a group. This results in three interaction groups: primary, secondary and tertiary.

The primary interaction is characterised by proximity and face-to-face mutual relationship and in it there exists oneness of thought and action. In secondary interaction, there exists casual relationship and is less frequent and less reciprocal. And the tertiary interaction is usually unplanned and the relationship is impersonal. The demarcation line between these interaction groups is not fixed. They mix with one another as concentric circles which widen with individual's increasing interaciion with others.

(iii) The social interaction on the basis of numbers can have three categories: one-with-one, one-with-group, and group-with group.

The one-with-one interaction of a child starts with mother first, and it gradually includes father, other siblings, playmates and school friends. The one-with-group interaction also starts in a family, where a child identifies himself in a group and recognises his role in that group. Later, as he grows, he identifies himself with groups outside the family and begins to assume different roles for himself. The group-with-group interaction is more complex than the above two types interaction. It extends to such things as neighbourhood quarrels etc.

Sibling relationship can be studied as a 'dyad relationship'. According to social psychologists, it is convenient to concentrate on dyad when studying such relationships as even the groups of siblings, called triads or quiads, can be taken as consisting of two or more dyads. Thus sibling relationships has been studied through interaction of one-with-one and one-with-group, each taken as a dyad.

Sibling relationships can be considered as being composed of two attitudes: that of one towards the other and that of the

other towards one. These attitudes can be positive (+ve) or negative (−ve), and thus the resulting relationships can be any combination of these attitudes; such as ++ (mutual positive), −−(mutual negative) and +−(mixed).

In the present study, the sibling relationships were proposed to be studied by the researcher by employing the following elements of social interaction.

The effect of opposition and cooperation among siblings have been studied in a family taken as a primary interaction group.

1.3 FACTORS INFLUENCING SIBLING RELATIONSHIPS

A number of factors exist which affect the attitudes of siblings in a family; and so are responsible for resulting in relationships between and among siblings as mentioned earlier.

Relationships between two persons come about due to the human behavioural patterns manifested by them. [Human behaviour as described by Brown (13), is controlled by both internal and external forces. The internal forces refer to factors related to biological heritage, physical make-up, psychological trait and individual attitude. The external forces are concerned with the situations and the study of individual behaviour in response to these situations.

Behavioural patterns arising out of a number of such factors have been explained by a number of theories. These are, for example, Freud (30) theory of behaviour based on instincts, McDougall (56) theory based on goals and purposes, Hull (40) theory of drive, Hedonism theory based on pleasure −pain consequences, Lewin (50) theory based on environment and situations, Festinger (25) theory of congnitive dissonance, Helder's (38) balance theory etc.

It may be mentioned at the outset that all the theories reflect various assumptions about human nature and motivation for it. A popular theory due to Freud (30), McDougall (56) and Hull (40) is that[1] behaviour is controlled or organized by biological conditions. Instincts, drives and biological needs

have been postulated as important components in human motivation. Also, the biological tendencies are modified by needs for security, money or purposes and goals. Another popular theory has focussed on hedonistic side of human behaviour. Hedonism asserts that people seek pleasure and avoid pain. The theory emphasises the exchange of tangible and intangible rewards as a kind of gains. While these theories explain how drives or sources of pleasure lead to behavior, these do not explain how people choose to behave in a particular ways. Lewin (50) insists that behaviour results from competing tendency. For this, an individual can be taken as a unit of analysis in an environment, be it a psychological, social or else, to which he is associated, which in turn determines his behaviour. Yet another theory of Festinger (25) is based on cognitive dissonance. According to this, people are motivated to reduce dissonance (*i.e.* tension) and this motivation in behaviour increases as the magnitude of dissonance increases. Other theories such as that of Heider (38), assume that people desire to maintain a balance and order and behave in a manner to achieve this around them.

According to these theories, people may have drives, may seek pleasure, may resolve competing tendencies and may strive for cognitive control but the psychologists find that people are also purposive. They plan their behaviour to achieve set goals. This requires definition of situations which dictate he behaviour. It is, therefore, concluded that human behaviour results from the interaction of both internal and external forces.

The sibling relationships can thus be studied through either study of an individual siblings or of their behaviour in response to different situations. This will involve study of a variety of sociological, environmental, and psychological factors. Here, family can be considered as a first and foremost situation for study of sibling relationships.

There are a number of factors connected with family situation that may affect relationships among siblings. According to Sears (71), what a sibling learns in his home is conditioned by a number of diverse factors. Such things as order of birth,

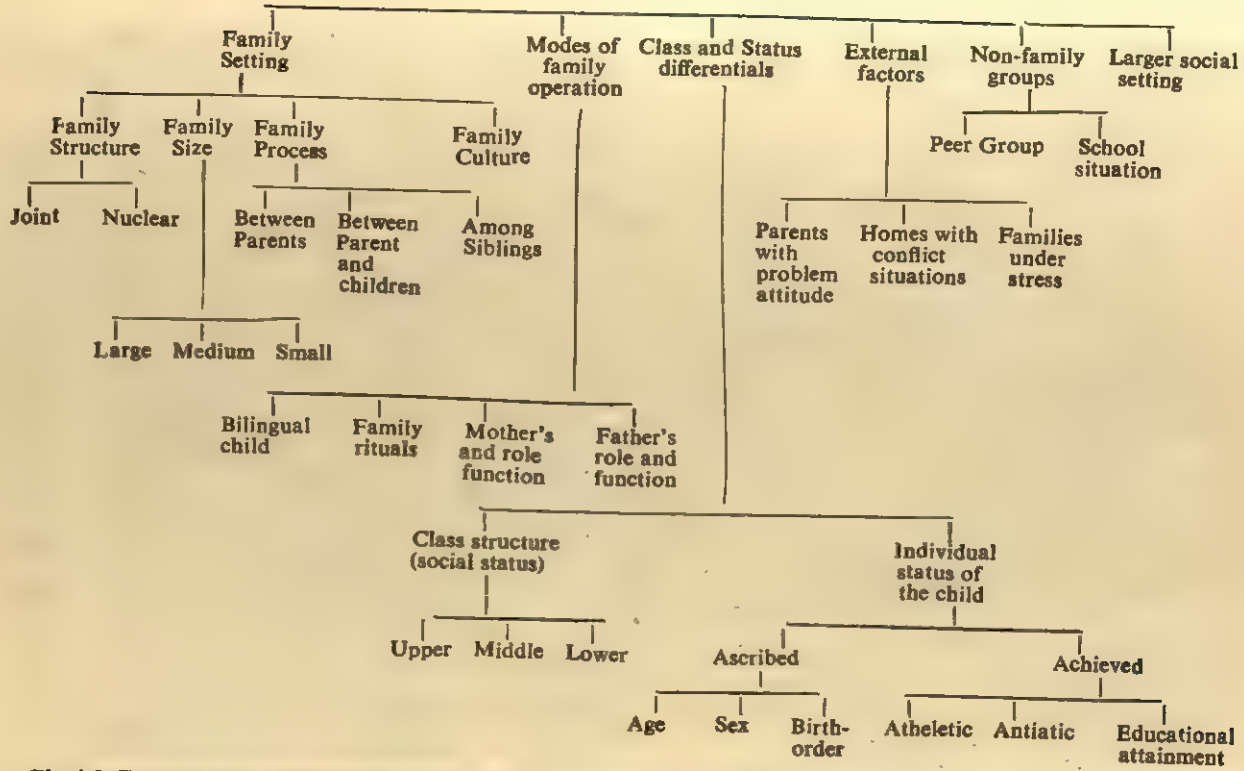
position of siblings, family size, marital relations of parents, the presence of handicapped sibling, whether the mother works, and whether the family belongs to a minority group, all effect the social learning experience of the sibling in his home.

However, Bossard (10) has given a detailed study of the sociology of child development in which he discusses the possible factors which influence the socialization of the child within the family group and in the non-family groups. The factors are categoriesed by Bossard most appropriately in such forms as: family setting, class and status differentlals, facets of family life, modes of family operation, problems in family operation, non-family groups and larger social settings. This categorization along with a further classification of these factors is indicated by the researcher in Figure—1.3 (page 13). Significance of each of these factors in the study of sibling relationships is discussed here briefly.

Family setting includes the study of its structure, process and content. Family setting as a 'structure' is to consider it as a form of organization. Such an organization is of two kinds, immediate house hold unit, comprising parents and children, *i.e.* the nuclear family, and Kinship-group including relatives in a family, *i.e.* the joint family. These organizational forms of family influence the child development as well as his relationships with the other members of the family.

Family setting could also be viewed in terms of size of the family. The size of the family determines the role of a child and the type of relationships he will have with the other members of the family. It also influences personality pattern of the child through the attitudes of other members of the family towards him. A popular belief is that larger the family size, more frictional it will be; and this has a direct impact on inter-sibling relationships. The size of family can be divided into three categories; small, medium and large. A small family is defined as having one that has one or two children, a medium family having three or four children and a large family having five or more children.

Family setting also includes the process of interaction among various members of the family. Through such interaction



Fig, 1.3. Factors Influencing Sibling Relationships in the Indian Context (Categorization Due to Bossard in the Context of Factos incluencing the Socialization of the Child).

each member of the family comes to develop an attitude toward every other member, for example, child towards child, parent towards child, child towards parent, and parent towards parent. Thus, what type of relationship a sibling will have for the other sibling will depend upon the attitude developed by him through interaction with the other members of the family.

Family setting also concerns the cultural content of the family. This is one of the most significant aspects of family situation in the formation of personality of its members. In popular parlance, culture is a synonym of good manners, proper etiquette, artistic taste, but as defined by sociologists (13);

> 'It is that complex whole which includes knowledge beliefs, art, morals, values, law, customs and other capabilities acquired by man as a member of society.'

For a child, it is a social heritage to which he is born and in which he is reared and nurtured. All these elements of culture go a long way in providing certain kinds of relationships with the members of the family and the outside world.

The second factor which may influence sibling relationship is class and status differentials. Sociologists have defined 'class' primarily in terms of social status; a particular class being a group of persons having approximately the same social status.

There are three social classes; upper, middle and lower, categorised purely from socio-economic angle. Such class differences enter the child rearing process from the beginning of the child's life and thus continue as operating factors as long as the child has relationship with his family members. Therefore, the socio-economic status of the family, which includes occupation, education and income of family members also, influences personal-social and scholastic development of the child.

Besides the social status of the family, the status of the child within the family also affects sibling relationships. There

are two main groups of status: ascribed, and achieved. The ascribed status can be described as having children with colour-complex, ethnic origin, sex, age, birth-order, plural birth, illegitimacy etc., and the achieved status, as having children who are open to competitive achievement to attain atheletic skill, artistic achievement, educational attainment etc. These factors are said to contribute significantly towards relationship among siblings.

The third factor which may influence sibling relationships is the mode of family operation which includes (in the Indian context) bilingualism, family rituals, parent's role and function.

Language is essentially a mechanism or medium for social interaction. It is a skill and may result in complexes in individuals in acquiring this skill. The linguistic development of a child can also have a bearing on his relationship with other family members.

The role and function of the parents in the family is largely conditioned by educational level and socio-economic level of parents, which may influence relationship among family members. Parent's attitude which affects the social development of the child are: when they reject their children, when they magnify their responsibilities and when they over-expect from their children.

The conflict among family members may arise when there is a lack of harmony among them in personal relations or cultural pattern. In some families, problems in inter-member relations result from the stress of outside influence such as housing inadequacy, residential mobility, economic pressure etc.

There are other social non-family groups which also influence the social development of the child. These are, for example, school, peergroup, and neighbourhood with which children interact and their behaviour and relationships with the other family members get modified according to the environment of the groups.

In the present study of sibling relationships, the factors considered were family settings and family class and status as

described in Figure 3 (page 13). These factors have certain implications in terms of social, psychological and educational development of the siblings, as presented in the above discussion.

1.4 PSYCHOLOGICAL AND EDUCATIONAL IMPLICATIONS OF SIBLING RELATIONSHIPS

The sibling relationships which are essentially built up through social interaction are expected to have recourse to psychology and education of the siblings. Factors which affect sibling relationships have implications in terms of education, social and emotional maturity of siblings.

Psychologists believe that personality is in good part a product of inter-personal relationship apart from the genetic constitution. According to Shaffer and Shoben (74), other things being equal, the types of relationships a child develops with his peers will determine to a large extent how he views the world about him and how he views himself.

The stydy of individual within a group and the internal social structure of the group can be made with the help of sociometric technique. Sociometric studies identify group positions of the individuals, such as star, isolate, neglectee, rejectee. Besides this, it indicates mutual choice, clique and cleavage etc. According to Emmerich (22), sociometric status or the position the individual has in a group is persistent although it may vary from one group to the other. This means that populars tend to remain popular, the disliked continue to be disliked and the neglected find themselves on the outside, no matter how long they are associated with the group.

Sociometric studies also reveal that the status of an individual in a group has impact on his personality. It is aiso stated that the more popular the person is the higher is his level of social participation, and popular person can show good emotional control; and social acceptance of the person has effect on his personality as it is related to good achievement while social rejection has opposite effect.

The siblings in a family who feel isolated or rejected among their other siblings are more likely to develop feelings of inadequacy and self-doubt. They are more apt to view the outside world as a cold and threatening place and to response by withdrawing from social contact or by showing aggressiveness, or hostility towards others, whereas the siblings who are popular have cordial emotional feelings towards their peers.

Educational psychologists have emphasised the role of school and other educational agencies, such as family, to the social growth and development of the child. According to Pyne (45), the school begins its educative work with children who have already acquired many of the social patterns, who have developed definit personalities, and who have a body of habits, knowledge and attitudes that will determine their whole future adjustment. Soloman (76), stressing this point, says that the school room must be looked upon as a force secondary in importance only to the home in the development of human personality. Thus the personality or behaviour pattern that siblings acquire as a result of interaction are expected to have educational implications.

There could be various reasons for a sibling not doing satisfactorily in his scholastic achievements. The scholastic success of the child greatly depends, apart from the mental ability, on his social and emotional problems also. Harrison (37), and Freud (29-30) suggest that home environment affect the child's attitude towards education. Failures, drop-outs etc. are some of the results of this. The studies on effect of factor such as age, sex, birth-order, and parental attitude and socio-economic status of the family and the school environment on their intelligence and the scholastic achievements have been reported by Bossard (11), Schoonover (70), Koch (45-48) etc.

In the present study, the effect of sibling relationships on psychology of the siblings was studied. Also the educational implications in terms of the scholastic success of the siblings was studies as a result of inter-sibling relationships.

1.5 STATEMENT OF THE PROBLEM

In the present research, it was proposed to study the effect of three major factors in the emergence of the favourable or unfavourable relationships between the siblings. The main focus was on studying cordiality of inter-sibling relationships as a result of the three factors of age, sex and birth order difference. The possible relationship of degree of coordiality, and the scholastic success of the child were subsequently examined.

1.6 DELIMITATIONS OF THE STUDY

1. The somewhat inclusive term 'sibling' was confined to the brothers and sisters having both parents in common.

2. Sibling relationships were limited to the 'dyad relationship form' through interaction of one-with-one and one-with-group, each taken as a dyad.

3. The major factors operative in sibling relationships were:

   (a) Sex (Brother-Sister)

   (b) Birthorder (Older-Younger)

   (c) Age differential (Large Age difference-small Age difference)

4. Nuclear families, with two to more number of children, and their socio-economic and cultural status were the areas of study.

5. Psychological study was confined to the degree of cordiality existing between any pair of siblings.

6. As regards educational implications, relationship between the sibling cordiality and the scholastic success of the child, in different settings of the three factors, viz. age, sex and birth order differential, was studied.

1.7 OBJECTIVES OF THE STUDY

The specific objectives of the present study were:

(i) To describe the nature of sibling relationships in several settings characteristics of the sibling population sampled.

This part of the study was a sample survey of a descriptive nature and was the initial stage of exploration for sibling relationship phenomenon. This was achieved using data obtained on sibling pairs of the sample selected on the criterion of the three factors already stated. A composite score was derived for each sibling which indicated his/her standing on the relationship continuum of cordiality. These data were used to show cordiality, or its absence, between siblings by comparison of Means by the t-test of significance of difference.

(ii) To indicate selected factors expected to be related to the cordiality continuum of sibling relationships.

For this, data on socio-economic status, cultural status and educational level of the family, apart from sex, age and birth order of the sibling were used for each sibling. Using the composite score as criterion, it was related to each of these factors turn by turn and thus showed which are correlated with good inter-sibling relationship and which are not.

(iii) To examine the relationship of sibling cordiality in its tripartite settings, viz. age, sex and birth-order to scholastic achievement.

For this, the average examination marks of siblings in their school were correlated with the composite cordiality score.

1.8 HYPOTHESES

While the variables for study had been selected on the basis of positive 'hunches' regarding the remifications of sibling

relationships, statistically, the null hypothesis was adopted. The forms of this null hypothesis put forward for testing were as follows:

(i) Age difference between siblings does not have any bearing on the cordiality between siblings.

(ii) Sex difference between siblings does not have any bearing on the cordiality between siblings.

(iii) Difference in birthorder of siblings does not have any bearing on the cordiality between siblings.

(iv) Socio-economic and cultural status of the family is not related to the cordiality between siblings.

(v) Cordiality among siblings does not have a bearing on the scholastic achievements of the siblings in any setting.

(vi) Cordiality among sibling does not have a bearing on the number of siblings in the family.

These hypotheses were tested against the obtained data and inferences were drawn from that. The null hypothesis is a statistical 'ploy' only and a clearer picture is expected to emerge.

The hypotheses determine the statistical context and logic for making a decision, but they do not answer the question of how different the sample mean must be from the population mean before one will reject the null hypotheses. This decision is taken in terms of probability, p. If the probability that in the observed sample mean difference produced is very small, less than a certain value, then the null hypotheses can be rejected. That 'certain probability value' is the significance level, designated α, of the test of the null hypotheses. In social

science research, the precise value of α is customarily taken to be .05. This implies that if the probability of an observed difference is less than 5 per cent, the null hypotheses will be rejected and the result will be said to be 'significant at the .05 level' or that '$p<0.5$.' The *t*-test of significance of difference was used for this purpose in the present study.

2

Review of Related Studies in the Field

Many researches (10-12, 19, 46-49), have been carried out concerning sibling composition variables, which include family size (number of children as main source of variablity), ordinal position, birth spacing, sex and certain specific patterns such as the only child, the adopted child and twins. These variables have been studied in order to find a link between the child's personality and behaviour and the intervening variable of family interaction, either parent-child or child-child.

A study of sibling relationship becomes complete when there is a full awareness of the family environmental factors. Sears (71), has designated some of these factors as sociological variables and discussed their psychological bearing.

Review of some studies reported here is thus confined to the studies carried out on the congenital factors of age, sex and birth-order difference among siblings and some other environmental factors such a socio-economic status and cultnral status of the family either in connection with the physical, mental and personality adjustment of the child or with sibling relationships.

2.1 STUDIES ABROAD

2.1.1 Birth-order, Personality Development and Achievement

Scientific interest in the effects of ordinal position on personality began with Freud (30), who claimed that a person's position in the sequence of brothers and sisters is of very great significance for the course of his later life. Adler (3), was also of the same view. In his study on 'A characteristics of the first, second and third children' he emphasized that each position provides a predictable personality pattern, with that of the middle and last child more favourable than that of the first-born. More scientific studies have shown what effects ordinal position has on personality. They have shown that these effects are due to the 'psychological position' of the person in the family rather than to his ordinal position. Greenberg (34) and Warren (84), have studied the effect of birth-order on the personality development of the child. They report,

> 'They first-born is likely to be the victim of excessive parental demands and expectations while later-born children grow up in a more permissive and relaxed atmosphere. In addition, later-borns have siblings to identify with and are thus freed from some of the pressures and expectations that come with almost exclusive adult identification'

The study by Weller (83), on 'The relationship of birth-order to cohesiveness' revealed that;

> 'First-borns tend to be more conforming and dependent than later-borns; they are more affiliative, specially in stress situations; they are more susceptible to group pressures and more withdrawn and introverted; they have less frustration, tolerance and are prone to angry out-bursts and they are often anxiety-ridden because they are afraid of not being able to live up to adult expectations.'

Sears and Maccboy (71) and Lewin (50), in their empirical study of the three steps, viz-ordinal position, child rearing and

child considered relationship between the first step and the third, the first and the second and the second and the third, each is concerned with establishing linkage between ordinal position and child resultants.

Reports also indicate that the effects of birth-order on personality do not end here but it is also reflected in their achievement. Such effects tend to be more persistent in the later-borns than in the first-borns. However, Bossard (10), Sears (71) and Sutton-Smith (75), reveal in their studies that high school teachers identify first-borns as superior students not because of higher levels of intelligence but because of stronger motivation, seriousness, adult orientation and susceptibility to external pressure. This has been substantiated by Altus (5), who reported that within families, more first-borns achieve success in adult life than later-borns.

On the other hand, Warren (84), was of the view that first-borns who achieve greater success than their later-born siblings tend to be bossy, selfish, self-centered and spoiled. They show their feelings of superiority about their achievements by derogatory comments and criticisms of others.

But, Schachter (73) has explained that the repeated findings of a surplus of first-borns among eminent scholars appear to have nothing to do with any direct relationship of birth-order to eminence but is simply a reflection of the fact that scholars, eminent or not, derive from a college population in which first-borns are in a marked surplus.

2.1.2 Sex Difference and Personality Development

Reports indicate that not only the ordinal position effects the personality of the child but sex difference among siblings also play an important role in their personality formation, because family expectations and family pressures to conform to these expectations differ for members of the two sexes.

Sutton-Smit (75), reported in his findings on 'Sibling consensus on Power Tactics' that sex difference in personality due to ordinal position indicates that first-born girls tend to be more bossy at home, while second-borns are more bossy at

play. Such behaviour is more common among girls with sisters than those with brothers.

Warren (84), in his study on 'Birth-order and Social Behaviour' found that boys, especially when they are older than their sisters, are stimulating and security-taxing to their sisters. As a result, girls learn to be more self confident and poised and to take teasing without having their feelings hurt. Boys who have older sisters tend to be quiet and with-drawn, depend ing more on others than on themselves. When they have older brothers they are more poised, more self-confident and less dependent.

Koch (44), in her extensive research on 'Sibling Influence on Child's Psychological Development's has investigated through an analysis of ratings assigned by teachers for a variety of traints. The study covered 360, five and six year old children from two-child urban native families. Investigated as independent variables were the sex of the child under study, the sibling ordinal position and the spacing between siblings less than two years, two to four years and four to six years. Her findings were that girls are judged more aggressive, more enthusiastic and tend to receive a higher rating on responsibleness, tenacity and planfullness than boys. In intellectual development, children with male siblinns scored higher than those with female siblings on both verbal sub-tests and total scores of the primary mental ability test.

In her other study. Koch (45), further reported that the only girl in a sibship becomes a tomboy while the only boy in the sibship will either have sissiness or will develop an attitude of superiority to all females.

2.1.3 Age Difference and personality Development

Not much attention has been given to the relationship between child spacing and sibling relations. Bossard (11), in his study on 'Large Family System' reported:

'The range and extent of contacts vary inversely with the time span between the birth of siblings. All other things

being equal, children born ten months apart will have more in common than those born after a ten years intervening period. Close companionship is more likely between siblings near in age; those separted by too long a period tend to grow up in a separate world.

Bossard and Sangner (11), have further found in their study that large age difference reduces affective bond. The cause may be that life activities are separate for siblings of widely different ages, whereas for those in the same age group there are likely to be shared.

Koch (46, 48), on the other hand reported that as the sibling age difference widens, it shows more aggressiveness, curiosity, originality, enthusiasm and planfullness.

2.1.4 Birth-ordər, Sex and age Difference of the Siblings and their Intelligence and Achievements

Schoonover (70) had carried out a study of the relationship of intelligence and achievements to birth-order, sex of the siblings, and age interval. The hypotheses of the study were:

(a) what is the relationship of the ordinal position of a child to his mental test performance?

(b) what is the relationship of the sex of a child sibling to his mental test performance?

(c) what is the relationship between age interval and degree of resemblence in mental achievement of siblings?

An analysis was made of sibling performance on intelligence and achievement tests utilising longitudinal data. The following were the findings:

(i) No significance differences were found between older and younger siblings in intelligence or achievement as measured by deviation from the norms of chronological age. That is priorty of birth in a family gave no advantage in intelligence or achievement.

(ii) Siblings, irrespective of sex, with brothers consistently had higher mental and achievementages than siblings with sisters.

(iii) The relationship between interval between births and the average difference in intelligence and achievement for sibling pairs was insignificant.

2.1.5 Size of the Family and Family Relationships

Bossard (10), in his book on 'The Sociology of Child Development' stated that the family size affects the activities of each member of the family and the combinations of different members within the family group. According to the belief, the larger the family the more frictional it will be. This has been explained mathematically by Bossard and Boll according to which the number of interpersonal relationships in a family can be determined by the following formula

$$X = \frac{Y^2 - Y}{2}$$

where X is the number of interpersonal relationships and Y is the number of family members.

In a 3 member family, for example, where there are a mother, a father and a child, there will be three interpersonal relations. If, however, there are four children and a mother and father in a family, the number of interpersonal relations will increase to 15. It is further stated that the only children develop a different personality pattern from those who spend the formative years of their lives in a family with one or two siblings, and they differ from children who are members of large families.

However, as regards the effect on sibling relationship, Bossard and Sangner (11), reported that

'Happiness, as reported by the children, increase as the family size increases. The reason for this is that with increase in family size, the time interval between births of

siblings decreases. Shorter intervals between births make for happier children.'

2.1.6 Socio-economic Status of Family and Sibling Personality Development

Describing the relevance of socio-economic status of the family on child development, Teagarden (81), stated;

'The parental anxiety that is engendered by poverty together with possible malnutrition and over-crowding of children, will in many cases cause psychic wounds. Equally unfavourable is a home setting of great wealth in which children are neglected by their parents and brought up by their servants whose ignorance of child rearing and lack of interest in children produce even more harmful effects on child attitude than those suffered in homes where poverty predominates.'

The social status of the family has been described by Friends and Mussen (31), as much to influence the physical, moral and mental development and personality adjustment of children.

2.2 STUDIES IN INDIA

A few researches carried out in India which are relevant in the context of the present research are reported in the following.

2.2.1 Ordinal position and Personality Development

In a study of the relationship between ordinal position and adolescent and the adjustements of siblings in a family by Reddy (67), the adjustment scores of 620 adolescent subjects in the 'first', 'second' the 'middle' and the 'last' ordinal positions were compared statistically. The findings were as follows:

(i) The first-born subjects were found most mal-adjusted closely followed by the middle-borns.

(ii) The second-born subjects were noted least mal-adjusted among all the above groups.

(iii) The groups noted as most mal-adjusted were found to reveal pronounced symptions of personal mal-adjustment.

2.2.2 Family Size and Sibling Relationship as Realated to Intelligence, Achievement and Behaviour Difficulties

Chopra (16), conducted a study on family size and sibling position related to measured intelligence and academic achivement. He observed a gradual decline in the mean intelligence test scores and mean examination marks as the size of the family increased. The differences in the means for the different groups were statistically significant in both the cases. The differences in the means for academic achievement continued to be significant even when intelligence was held constant through analysis of covariance. Ordinal position of children among siblings did not show any consistent relationship either with intelligence test scores or academic achievement.

Size of the family has also been considered one of the factors responsible for behavioural problems among siblings. In this context, a major finding of Murlidharan (60), was that when children from one, two, three and more than three child family units are compared, children from more than three-child family unit to show significantly less of problem behaviour than the children from the other types of family units. It was also found that there is no significant difference in problem behaviour between the children from one, two and three child family units. The result thus suggested that the smaller family system is more conducive to the development of problem behaviour. Accroding to Murlidharan, these results were inline with the traditions and values of Indian Culture. The traditionally orthodox Indian society respects and values a large family. The children from such family units get sufficient opportunities

to face competition, to give and take and to take responsibility. These childern grow together and much of the social training is done by siblings themselves rather than the parents. This seems to be advantageous for the mental health of the child. In small families, where parents or other adults in the family have to do the bulk of the disciplining, it may lead to a conflict in the child, in that the child finds is difficult to understand why a deeply devoted parent suddenly changes into a thwarting disciplinarian. This basic conflict is likely to cause disturbance in behaviour. Whereas in lage famlies both protection as well as disciplining on the part of the adults are limited. Parental pressure for social conformity is also much less in their case.

2.3 Discussion on the Findings and Present Research

It is noted that most studies carried out as reported in sections 2.1 and 2.2 centre on personality data of the subjects. They describe different behaviour patterns noted in the subjects as a result of various influencing factors. Some of these are found to be in agreement while others contradict with each other. It is however established that the congenital factors of age, sex and birth-order difference between siblings are found to play an important role in deciding the personality and behaviour pattern of the siblings. How they effect and what is the resulting effect depends on the environment and home settings. In the present research, one of the objective was to study the effect of these factors on sibling relationship.

Other factors such as size of the family, socio-economic status and cultural status of the family which have also been found to play a role in deciding the sibling behaviour, were also taken for study in the present research with a view to see their effect on sibling relationship. The effect of sibling relationship in-turn on the scholastic success of the siblings was also studied as a follow-up from that.

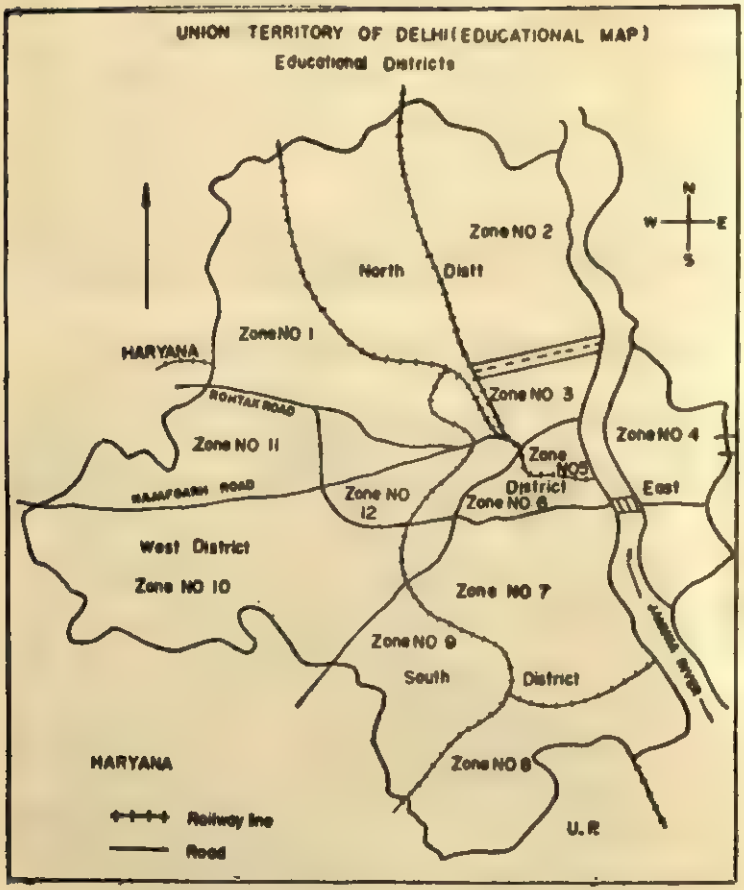


Fig. 3.1. Map of Union Territory of Delhi Showing Divison in Various Districts and Zones.

Source: Statisticel Branch, Directrote of Education Delhi Administration (1978).

3

Design of the Study

The starting point for the study of sibling relationships and their psychological and educational implications was to select a suitable sample, to be taken as the subject of present study, drawn from a cross section of available siblings. It was then necessary to collect data relevant to the present study from the available sibling pairs.

3.1 SELECTION OF THE SAMPLE

For this purpose, a close look at the spread of schools in Delhi was taken. The researcher noted that the Union Territory of Delhi is divided into four educational destricts namely North, West, South and East. Each of these four districts is further, sub-divided into three zones thus giving a total of 12 educational zones. An educational map of 'Union Territory of Delhi' showing these divisions is given in Figure- 3.3 (Page 38). Each zone showd here has a set of a certain number of boys' and grils' schools which are either government, aided, unaiped, or schools run by Central School Organisation or by the New Delhi Municipal Corporation situated in both urban and rural areas of Union Territory of Delhi.

A detailed break-up of the number of senior secondary, secondary and middle schools of different categories mentioned

TABLE

A Break-up of Number of Schools of the Union Territory of Delhi

	*Union Territory of Delhi**											
	North District						*East District*					
	Zone No. 1		*Zone No. 2*		*Zone No. 3*		*Zone N. 4*		*Zone No. 5*		*Zone No. 6*	
	B Sch.	*G Sch.*	*B Sch.*	*G Sch.*	*B Sch.*	*G Sch.*	*B Sch.*	*G Sch.*	*B Sch.*	*G Sch.*	*B Sch.*	*G Sch.*
Number in Urban area	30	27	23	24	35	34	49	50	42	38	43	41
Rural area	17	9	22	14	—	1	4	2	1	—	—	—
Total**	47	36	45	38	35	55	53	52	43	38	43	41
Govt. Schools	38	34	37	37	21	26	38	45	21	22	13	19
Aided Schools	4	2	3	1	10	9	8	7	20	14	21	16
Unaided Schools	4	—	5	—	4	—	7	2	2	2	6	3
N.D.M.C. Schools	—	—	—	—	—	—	—	—	—	—	2	3
Central Schools	1	—	—	—	—	—	—	—	—	—	1	—
Total**	47	36	45	38	35	35	53	52	43	38	43	41
Total number of Senior Secondary and Secondary Schools in Urban area	17	13	14	9	17	14	25	22	10	16	8	9

Note: B —Boys
G —Girls
Sch.—School
* includes both urban and rural areas
** includes Senior Secondary, Secondary and Middle Schools

3.I

South District						West District					
Zone No. 7		Zone No. 8		Zone No. 9		Zone No. 10		Zone No. 11		Zone No. 12	
B Sch.	G Sch	B Sch.	G Sch.	B Sch.	G Sch.	B Sch.	G Sch.	B Sch,	G Sch.	B Sch.	G Sch.
43	33	32	32	47	31	27	16	45	44	39	34
—	—	10	5	4	1	18	23	—	—	—	—
43	33	42	37	51	32	45	39	45	44	39	34
20	17	35	29	25	22	32	34	31	40	18	21
10	9	4	3	4	4	4	1	5	1	15	11
10	7	1	5	13	5	6	3	8	3	6	2
3	—	—	—	5	1	—	—	—	—	—	—
—	—	2	—	4	—	5	1	1	—	—	—
43	23	42	37	51	32	45	39	45	44	39	34
15	12	13	15	19	14	13	10	22	23	13	11

TABLE 3.II

Number of Schools of the Subject Group in different Areas covered in Zone Number 9,

Geographical Area	*Laxmibai Nagar*	*Moti Bagh I and II*	*Nauroji Nagar*	*R.K. Puram Sector II, III, VI and VII*	*Sarojini Nagar*	*Netaji Nagar*	*Green Park*	*Safdarjung Enclave*	*Mehrauli*
Total *No. of* Schools in the Subject *Group*	2	4	1	11	8	2	1	1	3

above in various educational zones is given in Annexure-I in the appendix (Source: Statistical Branch, Directorate of Education, Delhi Administration. 1978. Table-3. I (page 34) was prepared from Annexure-I, which shows at a glance the total number of schools of these different categories. Out of this, the total number of the group of senior secondary and secondary government schools in the urban areas have also been separately indicated in the same table, and this group was named as the 'Subject-Group'.

Table-3.I, also showed that out of the twelve educational zones, Zone numbers 4,9 and 11 had the largest number of schools of the subject group. From a detailed listing of schools in diefferent geographical areas covered in these three zones, which is given at Annexure-II, it was noted that there are few areas, namely, Gandhi-Nagar (Zone No. 4), R.K. Puram and Sarjiini Nagar (Zone No. 9) and Tilak Nagar (Zone No. 11), which have relatively large number of schools in the subject group. Zone No. 9 therefore was considered logistically convenient to provide a large number of schools in one geographical area for the present study. Table-3.II (page 36) shows the number of schools of the subject-group in different areas covered in Zone No. 9. The areas covered are Moti Bagh, R.K. Puram, Nauroji Nagar, Sarojni Nagar, Netaji-Nagar, Laxmibai Nagar, Mehrauli Greenpark and Safdarjung Enclave. Out of these, the area of Sarojini Nagar has one of the largest number of schools of the subject group (eight such schools) which were found to be clustered within the same geographical area giving and advantage of proximity. A map of Sarojini Nagar showing names and location of these schools is given in Figure-33 (Page 38). The area of Sarojini Nagar was taken as the field for study and the students studying in different schools in this area as the subject siblings. In this subject group, siblings studying in Class VI to XII with age group ranging from 12 to 18 years were taken for study as this group represents pre-adolescent and adolescent groups of students. An additional reason for selecting this area as the field for study was that the researcher herself was staying close to the area; and this provided ample opportunity to her to meet the subject

FIG 3.2 Map of Sarojini Nagar Showing Location of Eight Sr Secondary/ Secondary Schools And Other Primary/Middle Schools

Source Survey of India 1978-79

siblings both in the school and outside the school at different times.

Sarojini Nagar area comprises largely the residence of families belonging to the government employees ranging from senior gazetted officers to peons. Thus the area is representative of wide range of economic classes. This was evident from Table-3.III (given below), which gives the number of different categories of employees residing in the area of Sarojini Nagar and their average monthly income.

TABLE 3.III

Categorisation of the Residents in the Area of Sarojini Nagar and their Average Monthly Incom

Category of residential accomodation	*Number*
Total number of residential flats for govt. employees	4620
Flats under category II (for residents in the salary group Rs 260-400 and Rs. 500-999 (updaied)	3553
Flats under caetgory III (for residents in the salary group Rs. 500-999)	253
Flats under category IV (for the residentsin the salary group Rs. 1000-1499)	188
Flats released to Reserve Bank employees	226
Flate released to P and T employees	400

Category of Employee	*Percentage of Employees*	*Average monthly income*
Senior garzetted officers	10	Rs. 2000.00
Gazetted officers	30	Rs. 1200.00
LDC/UDC or their equivalent	40	Rs. 600.00
Peons or their equivalent	20	Rs. 300.00

Source: Directorate of Estate, Govt. of India, New Delhi-1978.

As the schools of the subject group were located within the Sarojini Nagar area, the students were largely from the families residing in that area. This follows from the rule of the Directorate of Education, Dehli Administration, that the children of the families residing in a particular area get preference for admission in the government schools of that area.

Since the field area selected for study had a large number of subjects, a s uitable sample from this area was selected to avoid loading of data. Various sampling methods are available for choice. These are; random sampling, stratified sampling, cluster sampling, stratified cluster sampling, and stratified random sampling. Important requirements for a sample are that:

(i) Its size should represent the population from where it is derived in the matter of characteristics being studied,

(ii) It should give precise results economically in the sense that high reliability is achieved at a minimum cost.

(iii) It should have a high precision level.

The sample selected should also be large enough to permit desired sub-classification of the total sample and reduce random or bias errors or bias to a minimum. According to Leslie Kish (43), when the object of the study are human beings, some sort of controlled sampling is used. Such controls are, for example, 'stratification' and 'randomization' which account for increase in accurary of the sample. In the present study, stratified random sampling was employed. The essential principle of stratification is that the total population is broken up into major groups or divisions or strata before the sample is drawn. A random sample is generally taken from each stratum in a proportion. Pitman (63), defines stratified random sample as a sample consisting of:

'Two or more random samples drawn from two or more subdivisions or strata of the universe, each stratum having been established with respect to one or more secondary

control factors, the size or weight of the samples drawn from each stratum corresponding to the proportionate size or weight of the control factors in the universe being studied'.

In order to apply this sampling procedure, a break up of students of boys' and girls' schools in Sarojini Nagar area was noted and is given in Table-3. IV (page 42). Total strength of students in the subject group in each of these schools was first noted. Out of these, the total number of siblings having their brothers or sisters studying either in the same school or in the other government schools of the same area were then selected. The resulting siblings were then divided into eight different categories according to their age difference, sex and birth order as shown in Table 3.V below the page No. 43.

This gave a certain number of siblings in each of the eight groups from where a sample for study was randomly drawn in a proportion.

3.2 VARIABLES TO STUDY

In order to study the factors which are responsible for favourable or unfavourable relationship between the siblings, the variables considered were:

Independent Variables:

(a) Congenital:
Age differential, birth order and sex of sibling, and number of siblings in a family.
These are not controllable except perhaps for the number of siblings in the family.

(b) Sociological:
Socio-economic, cultural and educational level of the family.
These are amenable to social control and action.

TABLE 3.IV

Number of Siblings Found in Different Schools of Sarojini Nagar as Compared to the Total Number

	Boys School'					*Girls' School*			
	School No. 1	*School No. 2*	*School No. 3*	*School No. 4*	*School No. 5*	*School No. 1*	*School No. 2*	*School No. 3*	*Total*
Strength of students ine ach School	1194	542	1150	1017	478	916	572	952	6815
Total number of siblings in the or same school other school of same area Age group 12-18 Class VI, XII.	242	131	212	184	128	232	121	212	1462

TABLE 3.V

Groupings of Siblings from the Subject Group

Sl. No.	*Siblings with 1-2 year age difference*			*Sl. No.*	*Siblings with more than two years age difference*		
	Older		*Younger*		*Older*		*Younger*
1.	Brother	—	Brotoer	5.	Brother	—	Brother
2.	Brother	—	Sister	6.	Brother	—	Sister
3.	Sister	—	Sister	7.	Sister	—	Sister
4.	Sister	—	Brother	8.	Sister	—	Brother

Dependent Variables: Cordiality and reciprocity among siblings, scholastic attainment of the siblings.

The researcher had, therefore, taken to study the effect of sibling cordiality and reciprocity on the personality of the child including a likely effect on his/her scholastic success.

For the objectives in view for this study, the data were to be collected for variables representing, cordiality between different pairs of siblings, measure of economic status (education, income and occupation of the family members) and cultural status (hobbies and interests) of the family and the measure of scholastic attainment of siblings. The purpose of this was to quantitatively assess the degree of cordial feelings of each sibling towards the other sibling of the pair. As the feeling tone of the ture relationship between any pair of siblings was expected to exhibit itself in their action, perception and unconscious urges, a suitable tool to measure each of these levels of feeling of cordiality between siblings was therefore to be devised.

3.3 TOOLS FOR DATA COLLECTION

In the present research primarilly the questionnaire technique was used by the researcher as a tool for collection of the required type of data.

Before the questionnarie was prepared, certain observations were made on the siblings of the study. For this, the researcher came in regular contact with a few families of the subject group representing a cross section of the families in the area of Sarojini Nagar. Frequent informal visits were made to these families in order:

(i) to know situations when siblings interact with each other;

(ii) to see if the sibling's behaviour changes with the socio-economic environment of the family;

(iii) to see the effect of parental education on sibling relationships; and

(iv) to see if the sibling's behaviour changes with the cultural status (hobbies and interests) of the family.

The observation indicated some degree of relationship between the cordiality of inter-sibling relationship and factors such as age, sex and birth order of the siblings and socio-economic and cultural status of the family. This observational study furnished the basis for formulating hypotheses regarding relationship among the independent variables and sibling-cordiality and helped the researcher in the preparation of the questionnaire.

3.3.1 The questionnaire

The available standardised questionnaires relating to the subject area, such as Family Relationship Inventory (FRI)

constructed by Sherry and Sinha (in 1972), Parent—Child relationship—by Bhatia (in 1975) etc., deal with family relationships under Indian situations. These do not provide adequate data for study of sibling relationships. Also, there are some Family Adjustment Inventories prepared by Patel, Parikh and Palsane which only deal with home adjustment problem of children. Therefore, a separate and more purposive instrument was necessary to be devised for the present study.

The objective of the present questionnaire was to obtain data regarding cordiality of the subject siblings towards another subject of the sibling pair through a study of their action, perception and unconscious urges in different situations. This was expected to yield an index of cordiality of siblings. For judging the actions of subject siblings, questions based on Bogardus (9) type scale were used. This is a social distance scale made up of number of statements selected on apriori basis to elicit response to measure the degree of intimacy or nearness which one social group or an individual will allow another in daily relationships. It is one of the sociometric techniques for studying the social relations between any two social groups or individuals. For judging perception of subject siblings, attitude indicative statements were used to indicate their positive or negative attitude towards one another. For judging unconscious level urges of the subject siblings, projective techniques devised by Lindzey (51), were used. These techniques are categorised as associative, construction, completion, ordering and expressive. In the present study, the researcher adopted completion techniques by using story telling and completion method.

3.3.2 Construcation of the Questionnaire

The questionnaire, placed at Appendix-III, was divided essentially in seven different sections; A through G.

Section A contained questions relation to general biographical information about the particular sibling, for example, name of the sibling, his/her class, school and age, father's name and family status (joint or single). Names, sex and age

of the other siblings in the family were also included in this section.

Sections B, C and D were used to serve as a measure of index of cordiality. These helped to study 'fact', surface', and 'depth' measure of cordiality index respectively of the siblings. Section B carried sixteen questions which were similar to the Bogardus scale. These used to elicit factual information regarding actions of each subject sibling which have a direct bearing on his/her relationship with the other subject of the sibling pair. Section C had ten attitude indicative statements, four of which were negative and six positive. These were used to indicate conscious level perception of the siblings to give surface maasure of cordiality index. Here, reference to personal relations between a given sibling pair were avoided to lessen contamination of their general attitude by any specific and transitory distortion in the mutual regard. Section D carried eight incomplete stories to be campleted by the siblings to see their behavioural reciprocity. This was a projective approach directed to elicit underlying feelings of the siblings. On the assumption based on various levels of human mind, it was felt that the cordiali.y of a sibling towards another would atleast involve repressed unconscious impulses also. These could only be studied by indirect means such as presenting unstructured, open-ended situations to the subject sibling which provide opportunity to project his/her genuine feeling towards the other subject of the sibling pair. Thus, for this purpose, use of projective type of incomplete story technique was made. The stories made involved emotional situations with the siblings figuring crucially in each case.

Section E of the questionnaire was used to know the socio-economic status of the family of the siblings. For this, information on the monthly income in the family and the profession/occupation of the members of the family was obtained.

Section F of the questionnaire was used to obtain the educational level and cultural status of the family of the siblings. The educational level was judged by finding the maximum educational qualifications of the members of family of the siblings. The cultural status, in terms of hobbies and interests

of the family members, was determined by finding out their interest in arts, magazines and books and their other achievements. This was done through a set of simple questions.

Section G of the questionnaire served to provide information on the scholastic attainments of the subject siblings by eliciting the total marks obtained by them in their last school examination.

3.3.3 Administration of the Questionnaire

The questionnaire was printed in English.

The researcher first visited Principals of all eight Senior Secoddary and Secondary Government Boys' and Girls' schools of Sarojini Nagar and explained to them the background of the present research programme. The researcher requested them for their support by giving her permission to meet their students of Classes VI to XII in the age group of 12 to 18 years, and to discuss with the selected sibling pairs the content of the questionnaire and get them to fill it up. This request was readily accepted by them.

The researcher went through the school registers of Classes VI to XII and noted the strength of students in each school. The sibling pairs who were either studying in the same school or those who had their brother or sister studying in another one of the government schools of Sarojini Nagar were then identified. A school-wise list of such siblings was prepared. As indicated in Table-3.IV (page 41). out of a total of 6815 students of the subject group, 1462 sibling having their brothers sisters studying in the schools of the subject group were identified. The questionnaire was administered on these selected siblings.

3.3.4 Pre-try-out attempt with the Questionnaire

Prior to giving the questionnaire to all siblings so-selected, a pre-trytout with the questionnaire was made on about 20 (twenty) selected siblings to see if the siblings of different age groups were able to respond easily and freely, or if they had

any difficulty in understanding and completing it in a reasonable time. The researcher noted that siblings in lower class groups, say VI and VII classes, took more time as against the siblings of upper classes. On an average, they required two periods *i.e.* about ninety minutes to complete the questionnaire. Also, some students had difficulty in answering some statements of section B of the questionnaire. Such statements carried a 'Yes' answer which meant an unfavourable attitude towards the other sibling, whereas, a 'No' answer should have meant for such an attitude. The siblings were helped in answering this part of the questionnaire and their answers were taken care of appropriately while scoring the questionnaire.

3.3.5 Administration of the Questionnairs on the total Subject siblings

In order to administer the questionnaire on the selected siblings of the subject group, different days were alloted for different schools in consultation with the Principals of various schools. Two to three days were taken for each school depending upon the total number of siblings available in the particular school. For each school, about two periods, preferably the last two periods, were taken for administering the questionnaire on the appointed day and time for a particular school. The concerned sibling were collected from different classes with the help of class teachers. The questionnaire was then distributed to then. The researcher fully explained to the siblings the procedure to be followed in filling up the questionnaire. The researcher also made clear to them that it was not a school examination and as such there were no set 'right' or 'wrong' answers to different questions of the questionnaire. They were advised to fill-up the questionnaire without consulting each other. They were assured that their answers would be kept confidential, and that they were free to write what they actually felt about their subject of the sibling pair. In this way, the questionnaire from all sibling pairs were collected after they were filled-up by the siblings.

While going through the questionnaires filled up by the siblings, researcher noted that the siblings had taken the questionnaire seriously and in most cases the answers were interpreted without difficulty. Out of a total of 1462 questionnaires that were distributed, 1334 questionnaires were selected. The remaining 128 questionnaires were those which either concerned siblings with ages exceeding 18 years or those that had to be rejected on grounds of incomplete questionnaire and siblings reporting about subject siblings not of one of the required kind of pair. The sibling pairs taken here comprised immediate younger or older brothers and sisters in the subject group.

The total siblings numbering 1334 as selected above were grouped as per Table-3.V (page 43). The resulting numbers are given in Table-3.VI below. Out of these numbers, every third sibling pair was randomly selected so as to give a mini-

TABLE 3.VI

Number of Soblings Selected as subjects in Eight Different Groupings

Siblings with 1-2 years age difference				*Siblings with more than two years age difference*				*Total No.*
Older (N)		*Younger (N)*		*Older (N)*		*Younger (N)*		
Brother	95 (31)	Brother	95 (31)	Brother	91 (30)	Brother	91 (30)	372 (112)
Brother	86 (28)	Sister	86 (28)	Brother	90 (30)	Sister	90 (30)	352 (116)
Sister	94 (31)	Sister	94 (31)	Sister	66 (22)	Sister	66 (22)	320 (106)
Sister	81 (27)	Brother	81 (27)	Sister	64 (21	Brother	64 (21)	290 (96)
Total	356		356		311		311	1334
No.	(117)		(117)		(103)		(103)	(430)

mum of 40 sibiing *i.e.* 20 siblings pairs in any of the eight groupings of this table. These numbers are given in paranthesis in Table-3.VI (page 49). From these number of siblings, 20 sibling pairs were taken from each grouping to give a total of 160 sibling pairs (*i.e.* 320 total siblings) for study which were called 'subject siblings'.

3.4 GROUPINGS OF THE SUJECT SIBLINGS

A total number of subject siblings for the present research were 320. These were first grouped according to their age, sex and birth-order difference. This grouping in sub-samples is shown in Table-3.VII below.

TABLE 3.VII

Age, Sex and Birth-order-wise Groupings of Subject Siblings into Sub-samples

Factor	*Sub-sample*	*Number of pairs*	*Total number of siblings*
Sex difference	Brother vs Brother	40	
	Sister vs Sister	40	
	Brother vs Sister	40	160
	Sister vs Brother	40	
Birth order difference	Older vs Younger	80	160
	Younger vs Older	80	
Age difference	Pairs with 1 or 2 years age difference	80	160
	Pairs with more than 2 years age difference	80	

A further grouping in smaller sub-samples was done, and is given in Table-3.VIII (page 51).

In the 320 siblings, the siblings are from class VIII to XII age group 14-18.

TABLE-3.VIII

Grouping of Subject Siblings into Smaller Sub-samples

Set	*Sub-sampl*	*Total No.*
Large Age difference	Much older brother Vs much younger brother of same sex	40
(more than 2 years)	Much older sister Vs much younger sister	40
	Much older brother Vs much younger sister of different sex	40
	Much older sister Vs much younger brother	40
Small Age difference	Just older brother Vs just younger brother of same sex	40
1 or 2 years)	Just older sister Vs just younger sister	40
	Just older brother Vs just younger sister of different sex	40
	Just older sister Vs just younger brother	40

The subject siblings were also grouped according to their ordinal position as follows:

Birth-order of children	*Total Number*
First-born	68
Middle-born (second, third and fourth born)	206
Last-born	46
Total	320

The subject siblings were also grouped according to the size of their families, for 160 sibling pairs, as follows:

Size of the family	*Total Number*
Two child families	19
Three child families	42
Four child families	36
Five child families	27
Six and more child families	36
Total	160

A grouping was also done according to predominance of male or female siblings in the families, for 160 sibling pairs, as follows:

Sexwise (children) grouping of the families	*Total Number*
Majority of boys	48
Majority of girls	60
Equal distribution of boys and girls	36
Only boys	13
Only girls	3
Total	160

A grouping was also done according to the economic status of the families, for 160 sibling pairs, as follows:

Income group categories	*Total Number*
1. (Rs. 200-500)	28
2. (Rs. 501-1000)	57
3. (Rs. 1001-2000)	61
4. (Rs. 2000 and above)	14
Total	160

Note: The income group categories mentioned above were drawn on the basis of the total monthly income in the family as indicated in the paranthesis above.

3.5. SCORING TECHNIQUES USED FOR THE DATA COLLECTION

At the very outset, it may be mentioned that the data collected through the questionnarie were scored, analysed and interpreted as it is usually done for test-data.

The data obtained in the form of answers to the questions and statements in different sections of the questionnaire were scored individually by the researcher to enable suitable statistical techniques to be applied for analysis.

Section 'A' of the questionnaire contained only general information about siblings and thus did not require any scoring.

Section 'B' carried sixteen questions, as for example, 'I like to share my secrets with him/her'. Each of such questions was given a point score of '1' for a favourable response indicating high cordiality, and a score of '0' for unfavourable response indicating no cordiality between the subject sibling and the other sibling of the pair about whom answers were given.

Section 'C' had ten statements indicative of positive and negative attitudes. For example, 'We get consolation from brothers and sisters in sorrows' or 'Brothers and sisters are jealous of achievements of each other.' In these statements, a point score of '1' was given for a favourable and '0' for an un-favourable response.

Section 'D' had eight incomplete stories. Completed stories were analysed. Those indicating a favourable feeling tone carried a point score of '2', those which were generally neutral, a point score of '1' and those which indicated lack of cordiality, a point score of '0'.

The total cordiality score of a subject sibling towards another sibling was computed as a composite of the scores in sections B, C and D of the questionnaire which represented his status on the relationship continuum.

Reciprocity score between any pair of the subject siblings was derived from the cordiality scores of the individual siblings of the pair. If S_x and S_y are the cordiality scores of the two siblings of the pair then the reciprocity score will be given by the relation, $(S_x - S_y)$.

Section 'E' gave socio-economic status of the family. For this the total montly income in the family and profession/ occupation of the family members were noted separately. As regards income four slabs of income range were made and each was weighted as follow:

Income range	*Weighted score*
Below Rs. 200	0
Rs. 200—500	1
Rs. 501—1000	2
Rs. 1001—2000	3
Rs. 2001 and above	4

Similarly, occupiion of different earning members of the family was scored with weights as follows:

Occupation	*Weighted Score*
Peons or equivalent	1
LDC/UDC or equivalent	2
Gaztted officers	3
Senior govt. servants	4

The weighted scores of income and occupation of each family member were then combined to give a total score for socio-economic status of the family. This will be a quantity ranging from 2 to 8. From this, four categories were drawn as follows:

Category	*Total score*
A	2—3
B	4—5
C	6—7
D	8

Section 'F' gave the educational status of the family. For this the weight given to different educational qualifications of the members of family were as follows:

Qualification held	*Weighted score*
Research degree	5.0
Master's degree or professional qualifying degree such as LLB, MBBS, ME, BE, etc.	3.5
Graduation degree	2.5
High School/Higher Secondary	1.5
Middle class	1.0
Literate/primary class	0.5
Illiterate/no-schooling	0.0

Total score was taken as the sum of different weigh ts of individual members of the family and it gave the educational status of the family.

Section 'F', in addition, gave the cultural status (hobbies and interests) of the familly. For this, weights give for the varrying interest in arts, reading magazines/books and other cultural achievements of different members of the family were as follows:

Interest/hobby fields	*Weighted Score*
Arts: Appreciate only	1
Practice only	3
Major contribution	5
Reading habbits:	
Newspaper (for reading of each paper)	1
Literature/arts item	2
Politics item	0.5

Games and other house-hold matters	0
Science items	2
Monthly/Weekly magazines read (for each good recognised magazine)	2
Articles:	
Literature/Arts	3
Science	2
Politics	1
Other-general	0
Books:	
Social/historical/Biography/Science	2
Adventure/Detective/Romantic/Fairy	1
Authors of Books preferred:	
Well known authors/books	1
Less known authors/books (for each book by one author)	1
Means of reading:	
by purchasing	3
by library membership	2
by borrowing	1
Any other cultural achievement: depending upon the type of achievement	1 to 3

The total of above scores gave the cultural status of the family.

Section 'G' indicated the scholastic success of the subject siblings. For this, the total percentage of marks obtained by the subject in the last school examination was taken as the measure of scholastic success.

3.5.1. Consistency-reliability of the data collected

When using an instrument, such as the questionnaire, it is important that its consistency and reliability are established. It is reliable to the extent that it measures accurately and consistently from one time to another, other conditions remaining same. It will have a high coefficient of reliability when errors of measurement are reduced to a minimum, Reliability is often applied to a set of measurements and is the proportion of their variance. Variance is the mean of the squares of deviations from the mean of the measurements. If the total variance of a set of measurement is denoted as σ_t^2, the coefficient of reliability r_{tt} is defined in Guilford (35), as

$$r_{tt} = \frac{\sigma_{\infty}^2}{\sigma_t^2} \text{ or } r_{t\infty}^2 \qquad (i\ e.,\ \text{correlation between true and total measure})$$

where σ_{∞}^2 is the true variance of a set of measurements and is the difference of totcl and error variance.

The procedures to estimate coefficient of relability fall in three major categories:

(i) Internal consistency reliability

(ii) Alternate or comparable forms-reliability

(iii) Test-retest reliability

Sometimes the even-odd method or the split-half method are used as part of these reliability estimate schemes. The reliability estimates due to these three schemes are termed as coefficients of consistency, equivalence and stability respectively. Choice of any of these will depend on considerations such as type of instrument, meaning of the statistics, purpose for which the statistics will be used, availability of the data format etc.

In the case of the present questionnaire, internal consistency estimate of reliability was applied. There are several operations by which this estimate can be made. These are Spearman-Brown formula (S-B), Kuder-Richardson (K-R) formula, Horst modification K-R formula, Rulan formula etc. All these depend on single administration of the test. The S-B formula is designed to estimate the reliability of a test 'n' times as long as the one for which a self correlation is known. In special form of S-B formula, split-half method of estimation is used. The split-half method, however, may develop bias errors due to arbitrary splitting. Rulan formula also has the same restriction as S-B formula, in that it uses split-half method. K-R formula though based on same assumptions as S-B formula, uses item statistics (item here is a subtest of a total test, for example, a section of the questionnaire) which gets away from such bias as is present in splitting. Further, it is justified in assuming that all items in the test have approximately the same degree of difficulty. Thus, an approximation K-R formula-21 was used in estimating the reliability of the questionnaire.

The present qustionnaire had seven sections, A through G. The reliability and validity was to be estimated for sections B, C and D. These sections pertain to the response given by subject siblings about another sibling of the pair at their conscious and unconscious levels which enable cordiality of one with another sibling to be determined. Other sections, *viz.*, A, E, F and G gave only factual data which were used to see if they had any effect on the cordiality of the sibling pair.

These sections, therefore, did not require estimation of the reliability.

In the questionnaire, the test length of items B, C and D were sixteen, ten and eight respectively. For composite of sections B, C and D, therefore, K-R approximation formula 21 was employed to estimate the reliability coefficient. An S formula was further used to account for the tripple length oi the tests, *viz.*, B, C and D.

Section 'D' had dealt with a projective type of test consisting of story completion by the subject siblings. An internal consistency of this test was therefore also estimated separately.

For this, K-R formula could not be used as the total weighted score in this section, which may be a maximum of 16, was more than n (*i.e.*, 8), the number of stories. Here, using the inter-correlation between scores of eight different stories, the researcher obtained 28 correlations. These gave an equal number of contingency coefficients derived using the formula

$$C=\sqrt{\chi^2/(N+\chi^2)}$$

where X^2 is chi-square and N the total number of subject siblings. These gave a lower-bound estimate of internal consistency of section D.

Validity often is referred to the test while reliability to its measurement. According to Guilford (35), it is a common belief that other things being equal, validity of a test is directly proportional to its reliability. That is, the more reliable a test, more valid it is. An exception to this relationship, however, exists when the test is heterogeneous. Thus, in some cases, goals of reliability and validity are incompatiable.

In general a test is said to be valid to the extent that it measures what it claims to measure. In the present case of a homogeneous test, validity is proportional to the reliability.

3.6. STATISTICAL TREATMENT EMPLOYED FOR ANALYSIS OF DATA

Statistics is an indispensable tool in research work. It is a body of mathematical techniques or processes used for organising, analysing and interpreting the available data. The data often deal with the quantitative characteristics of the object under consideration, and are the numerical statement of facts. For example, in the present research, the answers given by the subject siblings in response to various questions and statements of the questionnaire, when scored using certain weights or scales, presented the data on the subject siblings. Suitable statistical techniques were required to be employed in order to understand the meaning and implications of such data. This is difficult to do when either the data are large or are not in a form to provide direct inference which will be representative of the data available. It is, therefore, necessary to select suitable

techniques that can be used to analyse the available data on the subject siblings and to help derive inference from it.

In the present research problem, six different variables were under study. These variables were:

(i) Measure of cordiality of individual siblings,

(ii) Reciprocity between pairs of different siblings,

(iii) Measure of socio-economic status of the family,

(iv) Measure of cultural status of the family,

(v) Measure of educational level of the family,

(vi) Measure of scholastic achievement of individual siblings.

It is noted that these variables had a score for each of the 320 subject siblings selected. Also, each subject sibling defined by his/her age, sex and birth-order was a member of a sub-sample of Tables-3. VII (page 51) and 3. VIII (page 52).

Sibling cordiality was treated as a criterion variable in the statistical analysis adopted for the present research. The other variable divided themselves into two categories; congenital, such as age, sex and birth-order which are conditioned by birth, and environmental, such as socio-economic, cultural and educational status of the family as related to sibling relationship, which are amenable to social control and action. The number of siblings in each family partook of the nature of both congenital and environmental factors and its relation to sibling cordiality was also examined.

The statistical techniques utilised to analyse the data obtained from the subject siblings with respect to the above mentioned variables were aimed at examing the differences between various categories of siblings.

A 3-way analysis of variance was employed to examine the overall impact of the congenital factors and their interactions on both sibling cordiality and sibling reciprocity.

In view of the possibility of a large component of error in the analysis of variance, the sibling cordiality was examined

in a more detailed manner by employing t-test of difference between means of cordiality scores of various categories of siblings defined by their age, sex and birth-order.

Pearson γ was also used to examine relationship between cordiality of paired siblings. Further, correlation between the sibling cordiality and the socio-economic, cultural, educational level of the family and scholastic success of the siblings was studied.

Chi-square test was used to check null hypothesis where non-parametric data, such as the number of siblings in a family were available for study of relation of sibling cordiality to the number of siblings in a family.

In order to carry out the above analysis, the following procedures and steps were adopted.

3.6.1. Determination of Means

Mean is a short hand description of a mass of quantitative data obtained from a sample. Mean therefore describes indirectly, but with some accuracy, the population from which the sample is drawn. In such a description, use of means provides sampling stability. In the present research, means were obtained for original scores of sections B, C and D of the questionnaire and the cordiality scores of subject siblings. Since the original number of scores were large (320 scores) and mid points and frequencies of these scores were also large numbers, means were computed usidg coded methods as described by Guilford (35).

3.6.2. Determination of Standard Deviation

Information on mean of the scores does not give the total picture of the sample, in that it cannot indicate the extent of deviation from the mean value, *i.e.*, the dispersion in the scored. A method of indicating dispersion of the score by a certain number is therefore to be adopted. Standard deviation (σ) is considered a commonly used indicator of degree of dispersion and dependable source of estimation of the variability

in the total population from which the sample is drawn. The normal interpretation of standard deviation is made in terms of the percentage of number of scores included within the range from one-standard deviation below the mean to one-standard deviation above the mean. On the measurement scale, this range should include about two thirds of the total number of scores in the sample. In case of normal distribution, this range is -1σ to $+1\sigma$ with respect to mean score. This interpretation can thus be used to broadly check the accurary of σ computation.

In the present research, the standard deviation of scores of sections B, C and D of the questionnaire and the cordiality scores were determined to know their dispersion. Again, for this, coded method was adopted as the data were large and grouped in different sets.

3.6.3 Significance of difference between means of sub-samples

In the determination of means of scores of different subject siblings for any variable, it is necessary to establish confidence in the accuracy of the results before these can statistically be used to make any inference. For this purpose, difference between means of any two sub-samples of the sample population is obtained. But how much confidence should be placed in the belief that the obtained difference in means reflects a real difference. For this, Fisher's t-test of significance of difference between means is employed. Factor 't' is defined as the ratio of a deviation from the mean in a distribution of sample statistics to the standard error of that distribution.

In the present research, the means of cordiality scores of subject siblings in the large sub-samples of Table-3. VII (page 51) and samller sub-samples of Table-3 VIII (Page 52) were determined. These were then compared for significant difference using the Fisher's t-test of significance of difference formula to see the cordiality in sub-samples. The computed t values were compared with those from the t-distribution charts given in Guilford (35) for any significant level.

3.6.4 Correlation of Cordiality score with scores of other variables.

Correlational techniques are used to know the extent to which any two entities are related. In statistical terms, this is defined by the term coefficient of correlation (γ). Its value can very from a value of $+1.0$, which means perfect positive correlation, through 0, which means complete independence or no correlation, to -1.0, which means perfect negative correlation.

In the present research, correlation of cordiality score of subject siblings with scores of other variables, viz. socio-economic status score, cultural staus score, educational level score, scholastic acievement score, were individually determined by using Pearson Product-Moment formula. The correlation between cordiality scores of individual siblings of the pairs in the sample population was also derived to show the overal reciprocity between them.

3.6.5 Analysis of Variance

The purpose of using analysis of variance is to determine the probability that the means of several groups of scores deviate from one another merely by sampling error. In analysis of variance, the total variability in the score is partitioned into a portion that reflects differences between the means of the groups and the portion that is not influenced by those differences in the means. The test for determining the significance of the difference between two variances is the 'F ratio', which has known sampling distributions. By this approach, one can test whether or not two variances could probably have arisen by random sampling from the same population of observations, or from the two populations with the same variance.

Analysis of variance of cordiality scores in different sub-samples was employed in the present research. A three-way analysis of variance was adopted using age, sex and birth-order difference between siblings as factors shown in Table-3 VII (Page 51). These factors produced a 3-way block design for inter-sibling relationships. Diagramatically it is repreesnted in

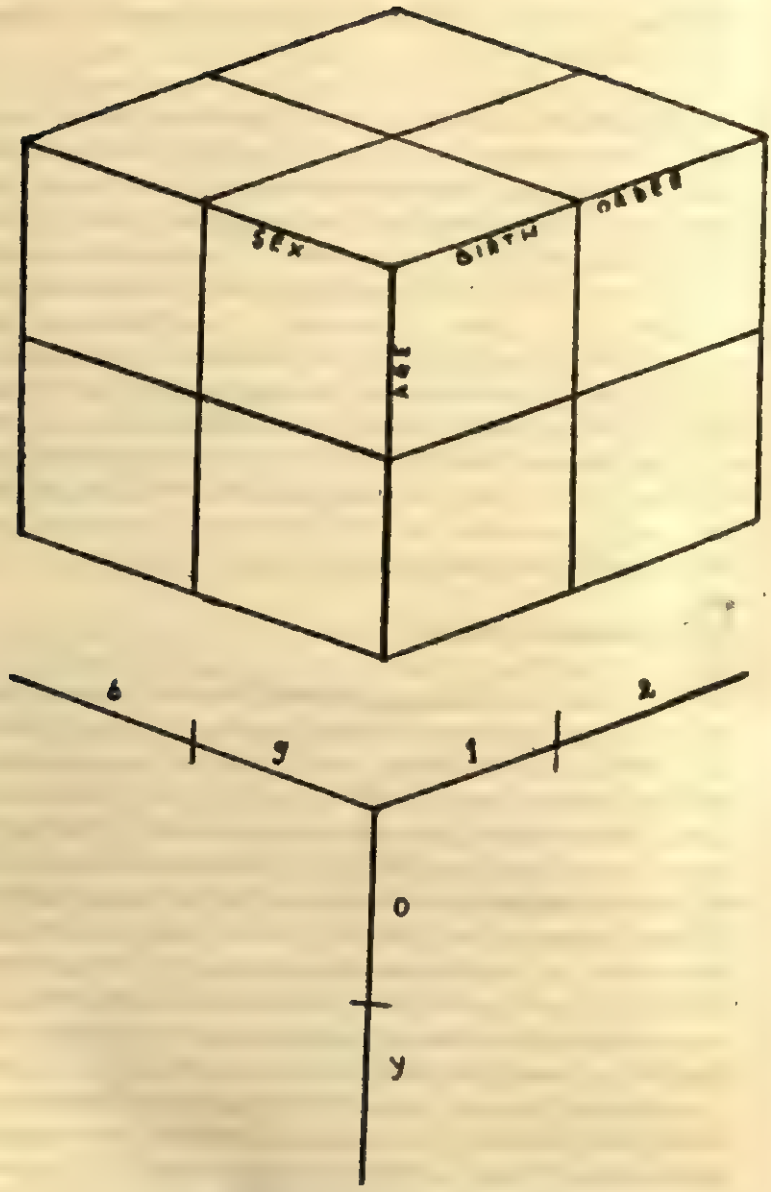


Fig. 3.3: A 3-way (2x2x2) 8 Block Design for Study of Inter-Sibling Relationship through Analysis of Variance.

Figure-3.3 (page 64). This figure produced $2\times2\times2=8$ blocks for analysis of variance. If birth order is syambolised by 1,2; sex by b (boy), g (girl); and age difference by o (older), y (younger), the following paired relations emerge;

Birth order of Sibling	*Age difference*
$b_1—b_2$	$b_o—b_y$
$g_1—g_2$	$g_o—g_y$
$g_1—g_2$	$g_o—b_y$
$b_1—g_2$	$b_o—g_y$

Since each pair represents reciprocal relationships, 16, types of relationships were involved. This analysis was undertaken with cordiality measure as the criterion score for the 8 blocks as above.

The aspect of reciprocity of cordiality between sibligs of a pair was also examined by subjecting the reciprocity score of the sibling pairs to the 3-way alalysis of variance.

3.6 6 Chi-square Test of Independence between Cordiality Score of Siblings and the Size of Their Family

In order to see the effect of the size of the family, as determined by the number of siblings in a family, on the cordiality of siblings to one another, a Chi-square test of independence was employed.

4

Statistical Analysis of Data

4.1 THE COLLECTED DATA

As stated earlier;

(i) The total number of subject siblings for the present research were 320.

(ii) These subject siblings were categorised in eight different sub-groups as planned indicated in Table-3.VI according to their age, sex and birth-order.

(iii) Each sub-group contained 20 sibling pairs.

(iv) The data obtained from individual siblings from each sub-group in the form of response to items in different sections of the questionnaire were scored as indicated in section 3.5.

(v) The scored values of the data on individual siblings produced the variables as given below;

a measure of cordiality for each individual sibling;

a measure of reciprocity between sibling pair;

a measure of socio-economic level of the family;

a measure of cultural level of the family;
a measure of educational level of the family;
a measure of scholastic success of each sibling.

4.2 CONSISTENCY-RELIABILITY OF THE DATA COLLECTED

Scores of sections B,C and D of the questionnaire taken together for each sibling gave a measure of cordiality for individual sibling. Section B dealt with the factual response regarding behaviour of one sibling towards another. Section C assessed at the conscious level the attitude and perception of the respondent. Section D assessed the motives at the unconscious level by projective techniques. These sections, therefore, required an estimation of reliability so that the consistency-reliability of the measure of cordiality of siblings could be judged. Other sections, viz. A,E,F and G of the questionnaire yielded factual data about the siblings and their families, such as, the economic status, cultural status and educational level of the family. These sections therefore did not require any estimation of their reliability.

For judging the reliability of sections B,C and D the following steps were involved:

The three sections were weighted inversely as the standard deviation of each section. This was done so that all sections could carry equal weight in the composite of B,C and D. For this, in each section, the mean and standard deviation were calculated. The mean was calculated using the formula from Guilford (35),

$$M = A + (\Sigma f x'/N)i$$

where, A is the assumed mean of the score,

f is the frequency of scores,

x' is the coded value for the class intervals of the scores,

i is the class interval of the scores,

N is the total number of scores

The standard deviation was calculated by using the formula from Guilford (35),

$$\sigma = \sqrt{\frac{\Sigma f x'^2}{N} - \left(\frac{\Sigma f x'}{N}\right)^2}$$

The tabulation and the relevant steps for calculating M and σ for sections B,C and D are given in Annexure-IV of the appendix. The results of these calculations and the weights to be applied to the scores in sections B,C and D as derived from the calculated values of mean and standard deviation are given in Table-4.I.

TABLE 4.I

Mean and Standard deviation of scores in sections B,C and D and the weights applied to them

Section of the questionnaire	*Maximum Possible score n*	*Mean M*	*Standard deviation σ*	*Weight*
B	16	12.02	2.13	2.13/2.13=1
C	10	8.04	1.53	2.13/1.53=1.4 =1.5*
D	16	11.09	1.37	2.13/1.37=1·55=1.5*

Note: *rounded off to as approximation as simply taken as 1.5

It was then necessary to get single mean values for M, n and σ for KR-short formula-21 to be applied for calculating reliability coefficient of the composite of sections B,C and D. The standard deviation of sections B,C and D combined is given by the formula from Guilford (35),

$$\sigma_t = \frac{1}{\sqrt{N}} \sqrt{n_b(\sigma_b^2 + d_b^2) + n_c(\sigma_c^2 + d_c^2) + n_d(\sigma_d^2 + d_d^2)}$$

where, N is the total length of test of sections B, C and D,

n_b is the total score in section B and likewise

n_c and n_d for sections C and D respectively,

σ_b is the standard deviation of section B and likewise σ_c and σ_d for sections C and D respectively, and

d_b is the deviation of mean in the section B from the average weighted mean of the total sample, and likewisd d_c and d_d for sections C and D respectively.

Thus $$\sigma_t=\frac{1}{\sqrt{42}}\sqrt{16\ (2.13^2+1.3^2)+10\ (1.53^2+2.68^2)+(1.37^2+0.27^2)}$$

or $\sigma_t=2.34$

Thus the single values of M, σ and n for composite of sections B,C and D are given as below:

Section	*n*	*M*	*Weighted mean nM*	*σ*
B	16	12.02	192.32	2.13
C	10	8.04	80.40	1.53
D	16	11.09	177.44	1.37
Sum	42	31.15	450.16	5.03
Single mean value for composite	14	10.38	10.72	2.34

The reliability coefficient given by KR-short formula-21 in Guilfored (35), for a composite of sections B, C and D is written as;

$$r_{tt}=\frac{n\,\sigma_t^2-M\,(n-M)}{(n-1)\,\sigma_t^2}$$

Using the values n=14, M=10.72, σ_t=2.34,

$$r_{tt}=0.58$$

The reliability coefficient, after taking into account the triple length for full three tests of composite of sections B, C and D, is given by the Spearman and Brown Prophey formula from Guilford (35),

$$r_{ttt}=\frac{3\times r_{tt}}{1+2\,r_{tt}}$$

Thus, $r_{ttt}=0.81$

This is quite high reliability coefficient.

In addition, the reliability coefficient of section D was separately estimated as it dealt with a projective type of test consisting of story completion. Here, K.R. Short formula-21 could not be used as the total weighted score of section D, which could be a maximum of 16, would be more than the number of stories (=8). For this, correlation between scores of different stories were assessed. There were 28 such correlations between 8 different stories given as;

$$\gamma=\frac{n(n-1)}{1\times 2}=28 \text{ for } n=8 \text{ (number of stories)}$$

Each correlation gave a contingency coefficient given by the formula from Guilford (35),

$$C=\sqrt{\frac{x^2}{N+x^2}}$$

where, x^2 is chi-square. given in McCall (57), N is the total number of subject siblings.

In the present study, seven correlations between successive stories from 1 to 8 were taken as estimate of all 28 correlations. These were,

$$\gamma_{12},\ \gamma_{23},\ \gamma_{34},\ \gamma_{45},\ \gamma_{56},\ \gamma_{67},\ \gamma_{78}$$

For each of these correlations, the x^2 value and then the contingency coefficient were calculated. The steps involved in these calculations are presented in the diagrams for seven correlations placed at Annexure-V of the appendix. These diagrams produced seven values of the contingency coeffiients. These values gave a 'lower-bound' estimate of a possible Pearson coefficient of reliability. Treating these value as γ_t, their average values were taken using Fishers's Z-functions from Guilford (35), as given on the next page:

Contingency Coefficient	γ_t	*Fisher's Z function*
C_{12}	0.15	0.15
C_{23}	0.13	0.13
C_{34}	0.32	0.39
C_{45}	0.19	0.19
C_{56}	0.36	0.38
C_{67}	0.39	0.41
C_{78}	0.56	0.63

The average value of Fisher's Z-function approximation and thus the reliability coefficient or internal consistency came to 0.31. This was taken as the coeffiicient of reliability between any two stories. As there were 8 stories in all, the 'test' was four times longer; Spearman—Brown Prophecy formula was accordingly applied. This gave an internal consistency as,

$$\gamma_{tt}=\frac{4\times 0.31}{1+3\times 0.31}$$

or $\gamma_{tt}=0.64$

This is considered bigh enough for projective type of tests.

In tests of this kind, no external criterion for validation was available. In such situations it is customary to treat internal

consistency as a proof of overall validity of the test. The researcher had also taken the precaution of securing the judgments of psychometricians as to whether the test measured what it intended to, and basing this incomplete story projective test on models available in tests recognised as valid, as mentioned in Mussen (58).

4.3. CORDIALITY SCORE AND RECIPROCITY SCORE OF SUBJECT SIBLINGS

The weights of 1, 1.5 and 1.5 as indicated in Table 4.I for sections B, C and D respectively of the questionnaire were applied to the scores of these sections. A sum of the weighted scares of sections B, C and D of a sibling yielded his cordiality score. In this way, cordiality scores of all subject siblings were obtained. Then difference of the cordiality scores of sublings of different pairs was computed to give the reciprocity score between different sibling pairs. This was a negative score in the sense that a large difference in cordiality scores of a pair indicated a lack of mutual responsive feelings *i.e.*, no reciprocity, whereas no difference indicated that the level of cordiality of the siblings of the pair was the same and reciprocity was full. Thus the reciprocity score did not indicate cordiality as such but indicated its mutuality between pairs whether negative or positive.

The values of cordiality score and reciprocity score of subject siblings under eight different sub-groups have been indicated in Annexure-II of the appendix.

4.4. ANALYSIS OF VARIANCE FOR INTER-SIBLING CORDIALITY

A three-way analysis of variance of $2\times2\times2$ factorial design (21) was applied to study the inter-sibling cordiality as a function of age, sex, and birth-order difference between siblings. In the first instance, the analysis was applied on a reduced sample of first 15 siblings selected from each of the eight sub-groups defined by age, sex and birth-order. This set corresponds to:

Number of sub-groups	:	8
Number of siblings in each sub-group (n)	:	15
Total sample of siblings (N)	:	120

The factors taken for study were designated as follows:

Age difference	A_1 : large age difference
	A_2 : small age difference
Sex difference	B_1 : brother
	B_2 : sister
Birth-order difference	C_1 : older sibling
	C_2 : younger sibling

The cordiality score S_x of all the sibliings of the reduced sample population alongwith their squares (S_x^2) were drawn and are presented at Annexure-VII of appendix. The results of sums of S_x and S_x^2 under eight different sub-groups are given in the Table-4.II.

Using the values from the Table-4.II various sources of variance as defined in McCall (57), were calculated as follows:

(i) Total sets SS

$$= \sum_{1}^{8} (\Sigma S_x^2) - [\sum_{1}^{8} (\Sigma S_x)]^2/N$$

where $\sum_{1}^{8}$ represents sum over all eight sub-groups

Total sets SS = 202437 − 194971.40

= 7465.60

(ii) Between sets SS

$$= \sum_{1}^{8} (\Sigma S_x)^2/n - [\sum_{1}^{8} (\Sigma S_x)]^2/N$$

TABLE 4.II

Cordiality Scores of Siblings under Eight Different Sub-groups

Cordiality scores	A_1 (*large age difference*)				A_2 (*Small age difference*)			
	B_1 (*brother*)		B_2 (*sister*)		B_1 (*brother*)		B_2 (*sister*)	
	C_1 (*older*)	C_2 (*younger*)	C_1 (*older*)	C_2 (*younger*)	C_1 (*older*)	C_2 (*younger*)	C_1 (*older*)	C_2 (*younger*)
ΣS_x	585	683	614	618	567	635	584	551
ΣS_x^2	23807	31299	25436	26334	22563	27845	23320	21833

$=2937005/15-194971.40$

$=828.93$

(iii) Within sets SS

=Total sets SS−Between sets SS

$=7465.60-828.93$

$=6636.67$

(iv) Main effect due to A (age difference)

$$A=\frac{(\Sigma S_x)^2}{\frac{A_1}{4n}}+\frac{(\Sigma S_x)^2}{\frac{A_2}{4n}}-\frac{[\sum_1^8(\Sigma S_x)]^2}{N}$$

$$=\frac{(2500)^2}{60}+\frac{(2337)^2}{60}-194971.40$$

$=221.41$

(v) Main effect due to B (sex difference)

$$B=\frac{(\Sigma S_x)^2}{\frac{B_1}{4_n}}+\frac{(\Sigma S_x)^2}{\frac{B_2}{4_n}}-\frac{[\sum_1^8(\Sigma S_x)]^2}{N}$$

$$=\frac{(2470)^2}{60}+\frac{(2367)^2}{60}-194971.40$$

$=88.41$

(vi) Main effect due to C (birth-order difference)

$$C=\frac{(\Sigma S_x)^2}{\frac{C_1}{4n}}+\frac{(\Sigma S_x)^2}{\frac{C_2}{4n}}-\frac{[\sum_1^8(\Sigma S_x)]^2}{N}$$

$$=\frac{(2350)^2}{60}+\frac{(2487)^2}{60}-194971.40$$

$=156.41$

(vii) Interaction A×B (age with sex difference)

$$A\times B=[(\underset{A_1B_1}{\Sigma}S_x+\underset{A_2B_2}{\Sigma}S_x)-(\underset{A_1B_2}{\Sigma}S_x+\underset{A_2B_1}{\Sigma}S_x)]^2/N$$

$$=[(1268+1132)-(1235+1202)]^2/120$$
$$=8.01$$

(viii) Interaction A×C (age with birth-order difference)

$$A\times C=[(\underset{A_1C_1}{\Sigma} S_x+\underset{A_2C_2}{\Sigma} S_s)-(\underset{A_1C_2}{\Sigma} S_s+\underset{A_2C_1}{\Sigma} S_s)]^2/N$$
$$=[(1199+186-(1301+1151)]^2/120$$
$$=37.41$$

(ix) Interaction B×C (sex with birth-order differenc)

$$B\times C=[(\underset{B_1C_1}{\Sigma} S_s+\underset{B_2C_2}{\Sigma} S_s)-(\underset{B_1C_2}{\Sigma} S_x+\underset{B_2C_1}{\Sigma} S_s)]^2/N$$
$$=[(1152+1169)-(1318+1198)]^2/120$$
$$=316.88$$

(x) Interaction A×B×C (age with sex with birth-order difference)

$$A\times B\times C=\text{Between SS}-[A+B+C+(A\times B)+(A\times C)+(B\times C)]$$
$$=828.93-828.53$$
$$=0.40$$

The results of analysis of variance applied on the reduced sample are summarised in Table 4.III on the next page:

This analysis indicated only the interaction of sex and birth-order as significant at 0.05 level and showed the main effect of age difference as approaching that critical level. All other factors and their interaction came out as non-significant.

In order to see if the larger sample could give the F-ratio to mature into significance for other sources of variance, a similar 3-way analysis of variance was applied to the entire sample of 320 siblings. This set corresponds to:

Number of sub-groups		: 8
Number of siblings in each sub-group (n)		: 40
Total sample of siblings	(N)	: 320

TABLE 4.III

Results of Analysis of Variance on Reduced Sample

Source of Variance	*Total SS*	*Degrees of freedom*	*Mean Sq.*	*F ratio*
Total sets SS	7465.60	—	—	—
Between sets SS	828.93	—	—	—
Within sets SS	6636.67	112	56.29	—
Main effect A	221.41	1	221.41	3.74
Main effect B	88.41	1	88.41	1.49
Main effect C	156.41	1	156.41	2.64
Interaction A×B	8.01	1	8.01	0.14
Interaction A×C	37.41	1	37.41	0.63
Interaction B×C	317.88	1	316.88	5.35*
Interaction A×B×C	0.40	1	0.40	0.01
Total		119		

Note: All sources of variance showed non-significance except the interaction B×C (sex with birth-order)* which was significant at 0.05 confidence level.

The cordiality score (S_x) and its square (S_x^2) in respect of the subject siblings of the sample population were tabulated as presented in Annexure-VII of the appendix. The results of sums of S_x and S_x^2 under eight different sub-groups are given in Table 4.IV below:

Using the values from the Table-4.IV above, various sources of variance were calculated as follows:

TABLE 4.IV

Cordiality Scores of Sibings under Eight Different Sub-groups

Cordiality scores	A_1 (*large age differenee*)				A_2 (*Small age difference*)			
	B_1 (*brother*)		B_2 (*sister*)		B_1 (*brother*)		B_2 (*sister*)	
	C_1 (*older*)	C_2 (*younger*)	C_1 (*older*)	C_2 (*youger*)	C_1 (*older*)	C_2 (*younger*)	C_1 (*older*)	C_2 (*younger*)
ΣS_x	1592	1747	1671	1671	1588	1667	1643	1618
ΣS_x^2	65280	77651	71275	72033	65402	71497	70121	68280

(i) Total sets SS

$$= \sum_{1}^{8} (\Sigma S_x^2) - [\sum_{1}^{8} (\Sigma S_x)]^2/N$$

$$= 561539 - 544252.53$$

$$= 17286.47$$

(ii) Between sets SS

$$= \sum_{1}^{8} (\Sigma S_a)^2/n - [\sum_{1}^{8} (\Sigma S_x)]^2/N$$

$$= 544724.03 - 544252.53$$

$$= 471.50$$

(iii) Within sets SS

= Total sets SS — Between sets SS

$$= 17286.47 - 471.50$$

$$= 16814.97$$

(iv) Main efferct due to A (age difference)

$$A = \frac{(\Sigma S_a)^2}{A_1 \over 4n} + \frac{(\Sigma S_a)^2}{A_2 \over 4n} - [\sum_{1}^{8} (\Sigma S_a)]^2/N$$

$$= \frac{(6681)^2}{160} + \frac{(6516)^2}{160} - 544252.53$$

$$= 85.07$$

(v) Main effect due to B (sex difference)

$$B = \frac{(\Sigma S_a)^2}{B_1 \over 4n} + \frac{(\Sigma S_a)^2}{B_2 \over 4n} - [\sum_{1}^{8} (\Sigma S_a)]^2/N$$

$$= \frac{(6594)^2}{160} + \frac{(6603)^2}{160} - 544252.53$$

$$= 0.25$$

(vi) Main effect due to C (birth-order difference)

$$C=\frac{(\Sigma S_x)^2}{\frac{C_1}{4n}}+\frac{(\Sigma S_x)^2}{\frac{C_2}{4n}}-[\sum_{1}^{8}(\Sigma S_x)]^2/N$$

$$=\frac{(6494)^2}{160}+\frac{(6703)^2}{160}-544252.53$$

$$=136.50$$

(vii) Interation A × B (age with Sex difference)

$$A\times B=[(\underset{A_1B_1}{\Sigma} S_x+\underset{A_2B_2}{\Sigma} S_x)-(\underset{A_1B_2}{\Sigma} S_x+\underset{A_2B_1}{\Sigma} S_x)]^2/N$$

$$=[(3393+3261)-(3342+3255)]^2/320$$

$$=0.03$$

(viii) Interaction A × C (age with birth-order difference)

$$A\times C=[(\underset{A_1C_1}{\Sigma} S_x+\underset{A_2C_2}{\Sigma} S_x)-(\underset{A_1C_2}{\Sigma} S_x+\underset{A_2C_1}{\Sigma} S_x)]^2/N$$

$$=[(3263+3285)-(3418+3231)]^2/320$$

$$=31.88$$

(ix) Interaction B × C (Sex with birth-order difference)

$$B\times C=[(\underset{B_1C_1}{\Sigma} S_x+\underset{B_2C_2}{\Sigma} S_x)-(\underset{B_1C_2}{\Sigma} S_x+\underset{B_2C_1}{\Sigma} S_x)]^2/N$$

$$=[(3180+3289)-(3314+3414)]^2/320$$

$$=209.63$$

(x) Interaction A × B × C (age with sex with birth-order difference)

$$A\times B\times C=\text{Between sets SS}-[A+B+C+(A\times B)+(A\times C)+(B\times C)]$$

$$=471.50-479.64$$

$$=8.14$$

The results of analysis of variance applied on the complete sample population are summarised in Table-4.V on next page.

TABLE 4.V

Results of Analysis of Variance on Complete Sample Population

Source of variance	*Total SS*	*Degrees of freedom*	*Mean Sq.*	*F ratio*
Total sets SS	17286.47	—	—	—
Between sets SS	471.50	—	—	—
Within sets SS	16814.97	312	53.89	—
Main effect A	85.07	1	85.07	1.58
Main effect B	0.25	1	0.25	.004
Main effect C	136.50	1	136.50	2.52
Interaction A×B	0.03	1	0.03	.0006
Interaction A×C	31.88	1	31.88	0.59
Interaction B×C	209.63	1	209.63	3.89*
Interaction A×B×C	8.14	1	8.14	0.15
Total		319		

Note: All sources of variance showed non-significance except the interaction B×C (sex with birth-order)* which was significant of 0.05 confidence level.

As is clear from the above, the analysis with the larger sample merely confirmed the largely negative results obtained with the similar analysis earlier given for a reduced sample.

4.5 MEANS AND STANDARD DEVIATIONS OF CORDIALITY SCORE OF SUBJECT SIBLINGS IN DIFFERENT SUB-SAMPLES AND SIGNIFICANT DIFFERENCES BETWEEN THEIR MEANS

In the analysis of variance, the effect of group differences due to age, sex and birth-order of siblings on their cordiality could not be seen as these inter-group differences were merged in the large component of within sets variance—the 'error-term', which reduced their significance. This error-term reduces

the chances of single sibling pair differences having any impact on the overall differences between the factors of age, sex and birth-order. A few differences between pairs of these factors are submerged in the general overall outcome. Hence it was decided, on account of the largely negative results of the analysis of variance, to compare the cordiality of eight sub-groups or the Sub-samples by a comparison of means through t-test. The steps involved for carrying this out are given in the following.

The means and standared deviations of cordiality score of the subject siblings under eight different groups were first computed. The relevant calculations are given in Annexure-VIII of the appendix.

Using these values, the means and standard deviations were tabulated for siblings under different sub-samples of Table 3. VIII (page 52) grouped according to age, sex and birth-order difference. This tabulation is presented in the Tables 4.VI, 4.VII and 4.VIII (page 83, 84 and 84 respectively).

TABLE 4.VI

Grouping According to Age Difference

Setting I: Large age difference (> 2 years) between siblings of a pair

Sub-group	*Mean*	*Standard deviation*
Much older brother	39.45	7.63
Much younger brother	45.7	5.22
Much older sister	40.85	4.50
Much younger sister	41.6	7.66
Much older sister	42.7	7.19
Much younger brother	41.65	6.09
Much older brolher	40.15	6.10
Much younger sister	41.45	7.25

Setting II: Small age difference (< 2 years) between siblings of a pair

Sub-group	*Mean*	*Standard deviation*
Just older brother	39.6	8.61
Just younger brother	42.05	7.64
Just older sister	41.75	6.01
Just younger sister	37.75	9.45
Just older sister	40.44	6.68
Just younger brother	41.3	6.5
Just older brother	39.8	6.53
Just younger sister	43.15	6.12

TABLE 4.VII

Grouping according to Sex difference

Setting I: All brothers

Sub-group	*Mean*	*Standard deviation*
Much older brother	39.45	7.63
Much younger brother	45.7	5.22
Much younger brother	41.65	6.09
Much older brother	40.15	6.10
Just older brother	39.6	8.61
Just younger brother	42.05	7.61
Just younger brother	41.3	6.54
Just older brother	39.8	6.53

Setting II: All sisters

Sub-group	*Mean*	*Standard deviation*
Much older sister	40.85	4.50
Much younger sister	41.6	7.66
Much younger sister	41.95	7.25
Much older sister	42.7	7.17
Just older sister	41.75	6.01
Just younger sister	37.75	9.45
Just younger sister	43.15	6.12
Just older sister	40.4	6.68

TABLE 4.VIII

Grouping according to Birth-order difference

Setting I: All olders

Sub-group	*Mean*	*Standard deviation*
Much older brother	39.45	7.63
Much older sister	40.85	4.50
Much older sister	42.7	7.17
Much older brother	40.15	6.10
Just older brother	39.6	8.61
Just older sister	41.75	6.01
Just older sister	40.4	6.68
Just older brother	39.8	6.53

(Contd)

Setting II: All youngers

Sub-group	*Mean*	*Standard deviation*
Much younger brother	45 7	5.22
Much younger sister	41.6	7.66
Much younger sister	41.55	
Much younger brother	41.65	6 09
Just younger brother	42.05	7.64
Just younger sister	37.75	9.45
Just younger sister	43.15	6.12
Just younger brother	41.3	6.51

The values of means and standard deviations obtained in six settings of Tables 4.VI, 4.VII and 4.VIII were used to give single average values under each setting. The average values of mean were computed by taking a simple arithmatic mean. Whereas, the average values of standard deviation were calculated by using the formula,

$$\sigma_t = \frac{1}{\sqrt{N}} \sqrt{n_1(\sigma_1^2 + d_1^2) + n_2(\sigma_2^2 + d_2^2) + \ldots + n_8(\sigma_8^2 + d_8^2)}$$

where, N is the sample size in a setting,

$n_1 \ldots .n_8$ is the sample size in the sub-group,

$\sigma_1 \ldots .\sigma_8$ is the standard deviation in the sub-group,

$\sigma_1 \ldots .\sigma_8$ is the deviation of mean in the sub-group, from the average mean in the setting.

Taking the values of N=160, n=20 and of σ and from above settings, the single average values of mean and standard deviation obtained in the six settings are given in Table 4.IX below.

TABLE 4.IX

Average values of Mean and Standard Deviation in Different Settings

Setting	*Mean*	*Standard deviation*
Siblings with large age difference	41.75	6.78
Siblings with small age difference	40.72	7.45
All brothers	41.21	7.13
All sisters	41.26	7.15
All olders	40.58	6.83
All youngers	41.89	7.38

The significant difference between the means of cordiality in different settings classified according to age, sex and birth-order difference between the siblings was then computed using the formula for t or 'critical ratio' given from Guilford (35), as:

$$t = \frac{M_1 - M_2}{\sqrt{\left(\frac{\sigma_1}{\sqrt{N-1}}\right)^2 + \left(\frac{\sigma_2}{\sqrt{N-1}}\right)^2}}$$

Where, M_1 and M_2 are means in settings 1 and 2 σ_1 and σ_2 are standard deviation in settings 1 and 2 N is the size of each setting (both settings taken equal in size)

The values of critical ratio obtained under different settings are given below:

Settings	*Critical ratio*
Difference between means of cordiality scores of large and small age difference of siblings	1.3
Difference between means of cordiality scores of all brothers and all sisters	0.06
Difference between means of cordiality scores of all olders and all younger siblings	1.65

Note: The values of critical ratio obtained above are non-significant at 0.01 level.

The above indicates that none of the three factors of age, sex and birth-order difference have a marked effect on sibling relationships.

The effect of interaction of the factors of age, sex and birth-order on sibling cordiality was also examined through a visual inspection of means in four-celled tabulations involving age, sex and birth-order in 2×2 combinations.

Using the values of means from Annexure-VIII, means of cordiality score were tabulated for siblings under different sub-samples of Table 3. VII (page 51) grouped according to their age, sex and birth-order difference. The results are given in Tables 4. X, 4. XII in the following.

TABLE 4 X

Means of Cordiality Scores Under Age Difference Versus Birth-Order of Siblings

Mean of cordiality score	*Large age difference (>2 years)*	*Small age difference (<2 years)*	*Average value*
Older	40.79	40.39	40.58
Younger	42.72	41.06	41.89
Average value	41.75	40.72	

The four-celled values of means presented in Table 4. X (above) show that older among siblings with small age difference have a much less cordial feeling for their opposite member (regardless of sex) than younger siblings have for their elder brothers and sisters when the age difference is large. The trend with average mean values shows that cordiality of younger siblings is slightly greater than that of older ones. Also, large age difference expectedly shows better cordiality than small age difference.

TABLE 4 XI

Means of Cordiality Scores under Age Difference Versus Sex of Siblings

Mean of cordiality score	*Brother*	*Sister*	*Average values*
Large age difference (>2 years)	41.74	41.77	41.75
Small age difference (<2 years)	40.69	40.76	40.72
Average Value	41.21	41 26	

The values of means in Table 4 XI (page 88) suggest that so far as sex is concerned, it does not have any significant effect of sibling relationship. However, it seems that large age difference does favour, regardless of sex, a more cordial relationships than that expected among contemporaries with smaller age difference.

The values of means in Table 4 XII (page 90) reinforce the findings from the earlier two representation of means. That is younger siblings have slightly better attitude towards their elder ones than vice versa, and that sex makes no difference in inter-sibling relationship. Also, younger and older sisters have similar mutual attitudes but among brothers older ones show much less cordiality in return for a much higher regard they get from their younger brothers.

TABLE 4 XII

Means of Cordiality Scores under Sex Difference Versus Birth-order of Siblings

Mean of cordiality score	*Brother*	*Sister*	*Average value*
Older	39.75	41.42	40.58
Younger	42.68	41.11	41.89
Average value	41.21	41.26	

4.6. ANALYSIS OF VARIANCE OF RECIPROCITY SCORE

Reciprocity between sibling pairs characterised by age, sex and birth-order differences was also subjected to 3-way analysis of variance to study the effect of factors of age, sex and birth-order on the reciprocity of the sibling pairs. As stated earlier, reciprocity is defined as the degree of matching response in sentiments and feelings in any pair of siblings. Operationally, a measure of this was obtained by taking the absolute difference between the cordiality score of the members of each pair. The obtained score was a reverse score, as a large difference in cordiality scores represented a lack of reciprocity, and no difference indicated that the attitudes and disposition towards each other in a pair of sibling were equally better or worse *i.e.*, the reciprocity was maximum. As this negative score of reciprocity score made no difference to the variance, it was used without further manipulation for the analysis of variance.

A 3-way analysis of variance of $2\times2\times2$ factorial design was adopted. The factors taken were designated as follows:

Age $\begin{cases} A_1 : \text{large age difference} \\ A_2 : \text{small age difference} \end{cases}$

Sex $\begin{cases} B_1 : \text{siblings of same sex} \\ B_2 : \text{siblings of different sex} \end{cases}$

Birth-order $\begin{cases} C_1 : \text{older brother—younger sister} \\ C_2 : \text{younger brother—older sister} \end{cases}$

A reduced sample of 10 siblings from each of the eight sub-groups was taken. This set corresponds to:

Number of sub-groups	: 8
Number of sibling pairs selected from each sub-group (n)	: 10
Total sample of sibling pairs (N)	: 80

The reciprocity score R of the sibling pairs of the sample and its square (R^2) were computed from the table of Annexure-VI in the appendix. The results are given in Annexure-IX in the appendix. The sums of R and R^2 under eight different sub-groups are given in Table 4 XIII on the next page.

Using the values from the Table 4 XIII (next page), various sources of variance were calculated as follows:

(i) Total sets SS $= \sum_{1}^{8}(\Sigma R^2) - [\sum_{1}^{8}(\Sigma R)]^2/N$

$= 6660 - 4075.51$

$= 2584.49$

(ii) Between sets SS $= \sum_{1}^{8}(\Sigma R^2)/n - [\sum_{1}^{8}(\Sigma R)]^2/N$

$= 4313.65 - 4075.51$

$= 238.14$

(iii) Within sets SS = Total sets SS — Between sets SS

$= 2584.49 - 238.14$

$= 2346.35$

(iv) Main effect due to B (sex difference)

$$B = \frac{(\Sigma R)^2_{B_1}}{4n} + \frac{(\Sigma R)^2_{B_2}}{4n} - [(\sum_{1}^{8}\Sigma R)]^2/N$$

$$= \frac{(319.5)^2}{40} + \frac{(251.5)^2}{40} - 4075.51$$

$= 57.80$

TABLE 4 XIII

Reciprocity Score of Siblings pairs (10 pairs) under each of Eight Sub-groups

Reciprocity Score	B_1 *(same sex)*				B_2 *(different sex)*			
	A_1 *(large age difference)*		A_2 *(Small age difference)*		A_1 *(large age difference)*		A_2 *(small age difference)*	
	C_1	C_2	C_3	C_4	C_1	C_2	C_3	C_4
	(O. br.)	*(Y. sis)*	*(O. br.)*	*(Y. sis)*	*(O. br.)*	*(Y. sis)*	*(O. br.)*	*(Y. sis)*
ΣR	96.5	77.5	79.5	66.0	57.5	41.0	61.5	91.5
ΣR^2	1540.25	859.25	1098.25	925.75	395.75	231.0	544.25	1065.25

(v) Main effect due to A (age difference)

$$A = \frac{(\Sigma R)^2_{A_1}}{4n} + \frac{(\Sigma R)^2_{A_2}}{4n} - [\sum_{1}^{8} (\Sigma R)]^2/N$$

$$= \frac{(272.5)^2}{40} + \frac{(298.5)^2}{40} - 4075.51$$

$$= 8.45$$

(vi) Main effect due to C (birth-order difference)

$$C = \frac{(\Sigma R)^2_{C_1}}{4n} + \frac{(\Sigma R)^2_{C_2}}{4n} - [\sum_{1}^{8} (\Sigma R)]^2/N$$

$$= \frac{(295)^2}{40} + \frac{(276)^2}{40} - 4075.51$$

$$= 4.52$$

(vii) Interaction A × B (age with sex difference)

$$A \times B = [(\Sigma R_{A_1 B_1} + \Sigma R_{A_2 B_2}) - (\Sigma R_{A_1 B_2} + \Sigma R_{A_2 B_1})]^2/N$$

$$= [(174 + 153) - (145.5 + 98.5)]^2/80$$

$$= 86.11$$

(viii) Interaction B × C (sex with birth-order difference)

$$B \times C = [(\Sigma R_{B_1 C_1} + \Sigma R_{B_2 C_2}) - (\Sigma R_{B_1 C_2} + \Sigma R_{B_2 C_1})]^2/N$$

$$= [(176 + 132.5) - (143.5 + 119)]^2/80$$

$$= 26.45$$

(ix) Interaction A × C (age with birth-order difference)

$$A \times C = [(\Sigma R_{A_1 C_1} + \Sigma R_{A_2 C_2}) - (\Sigma R_{A_1 C_2} + \Sigma R_{A_2 C_1})]^2/N$$

$$= [(154 + 157.5) - (141 + 118.5)]^2/80$$

$$= 33.8$$

(x) Interaction A×B×C (age with sex with birth-order-difference)

$$A\times B\times C = \text{Between sets} - [A+B+C+(A\times B)+(B\times C)+(A\times C)]$$
$$= 21.01$$

The results of analysis of variance are summarised in Table 4 XIV below:

TABLE 4 XIV

Results of Analysis of Variance of Reciprocity Score

Source of variance	*Total SS*	*Degrees of freedom*	*Mean Sq.*	*F ratio*
Total sets SS	2584.49	—	—	—
Between sets SS	238.14	—	—	—
Within sets SS	2346.35	72	32.59	—
Main effect A	8.45	1	8.45	0.26
Main effect B	57.80	1	57.80	1.77
Main effect C	4.52	1	4.52	0.14
Interaction A×B	86.11	1	86.11	2.64
Interaction B×C	26.45	1	26.45	0.81
Interaction A×C	33.8	1	33.8	1.04
Interaction A×B×C	21.01	1	21.01	0.64
		Total 79		

Note: None of the F-ratios were found to be significant at 0.01 level of confidence.

This analysis of degree of reciprocity between pairs of siblings showed that none of the factors produced any differences for any category of siblings defined by age, sex and birth-order.

4.7 CORRELATION BETWEEN SIBLINGS' CORDIALITY AND OTHER VARIABLES

Correlation of cordiality scores between two siblings of the sibling pairs of the total sample was computed using Pearson formula from Guilford (35), given by,

$$\gamma_{xy} = \frac{\Sigma x' y'/N - M_{x'} M_{y'}}{\sigma_{x'} \sigma_{y'}}$$

where, x and y are the cordiality scores of the siblings of a pair,

x' and y' are deviations of coded values for x and y from their respective means,

N is the total number of sibling pairs of the population (N=160),

$M_{x'}$ and $M_{y'}$ are means of coded values x' and y' given as,

$$M_{x'} = \frac{\Sigma f_x d_x}{N} \text{ and } M_{y'} = \frac{\Sigma f_y d_y}{N}$$

$\sigma_{x'}$ and $\sigma_{y'}$ are standard deviations of coded values x' and y' given as,

$$\sigma_{x'} = \sqrt{\frac{\Sigma f_x d_x^2}{N} - M^2_{x'}} \text{ and}$$

$$\sigma_{y'} = \sqrt{\frac{\Sigma f_y d_y^2}{N} - M^2_{y'}}$$

A scatter diagram with cordiality score x of siblings on one-axis and cordiality score y of sibling on anotheraxis was drawn. Tallies of cordiality scores of all sibling pairs were entered in this diagram given at Figure-4.1 (page 94A to 96D). Using the tallies, parameter values such as f_x, f_y, d_x, d_y, $f_x d_x$, $f_y d_y$, $f_x d_x^2$, $f_y d_y^2$ and x', y' were also entered in the scatter diagram. The following results were obtained:

FIGURE 4.1

	SIBLING −X−−−→				SIBLING—Y−−−→						
Cordiality Scores	*16-18*	*19-21*	*22-24*	*25-27*	*28-30*	*31-33*	*34-36*	*37-39*	*40-42*	*43-45*	*46-48*
61-63											
58-60											
55-57											
52-54					1 —15				1 5	2 20	3 45
49-51				1 —16	0 0	3 —24	2 —8	3 0	4 16	6 48	6 72
46-48					1 —9	1 —6	3 —9	4 0	2 6	4 24	1 9
43-45						1 —4	3 —6	4 0	2 4	2 8	4 24
40-42			1 —5	1 —4		3 —6	2 —2	4 0	8 8	3 6	3 9

37-39	1 0		1 0	1 0	2 0	2 0	1 0	4 0	6 0	3 0	
34-36		1 5	0 0	1 3	1 2	3 3	4 0	2 −2	0 0		
31-33						4 0	3 −6				
28-30				2 12	2 6	1 0	1 −3				
25-27					2 8			1 −8			
22-24											
19-21				2 20							
16-18								1 −14			
fx	1	0	2	3	4	15	19	25	27	25	23
d	−7	−6	−5	−4	−3	−2	−1	0	1	2	3

Fig. 4.1 (*Contd.*)

fxd	—7	0	—10	—12	—12	—30	—19	0	27	50	69
fxd^a	49	0	50	48	36	60	19	0	27	100	207
+	0	0	5	0	3	34	17	0	39	106	159
—	0	0	5	20	24	40	25	0	11	22	9

Fig. 4.1 (*Contd.*)

Cordi-lity Scores	*49-51*	*52-54*	*55-57*	*58-60*	*61-63*						
61-63											
58-60											
55-57											
52-54	1 20	1 25	1 30			10	5	50	250	145	15
49-51	2 32	2 40				29	4	116	464	208	48
46-48						16	3	48	144	39	24
43-45	4 32					20	2	40	80	68	10
40-42	4 16					29	1	29	29	39	17
37-39						21	0	0	0	0	0

	3		1								
34-36		−9		−4		16	−1	−16	16	13	15
31-33						7	−2	−14	28	0	6
28-30						6	−3	−18	54	18	3
25-27						3	−4	−12	48	8	8
22-24						2	−5	−10	50	20	0
19-21						0	−6	0	0	20	0
16-18						1	−7	−7	49		−14
fx	12		3	1		160	Σfyd	1212	5	38	160
										398	
d	4		5	6			−20	6			
fxd	48		15	6	125	=	Σfx	d			
fxd^2	192		75	36	899						
+	100		65	30	588						
−	4		0		160						

Note: First number in each block denotes tallies of cordility scores and the second number represents the product of tallies and the d^2 of both the exes.

Figure—4.1 Scatter diagram for Cordiality Scores between sibling pairs of the total sample.

$\Sigma f_x' = 125, \ \Sigma f_y' = 206$

$M_x' = 125/160 = 0.78' \ M_y' = 206/160 = 1.29$

$$\sigma_x' = \sqrt{f_x'^2/N - M_x'^2}$$

$$= \sqrt{899/160 - 0.61}$$

$\Sigma_x' = 2.238$

$$\Sigma_y' = \sqrt{f_y'^2 N - M_y'^2}$$

$$= \sqrt{1212/160 - 1.66}$$

$\sigma y' = 2.432$

Using these results, the Pearson correlation γ_{xy} between cordiality scores of siblings x and y of sibling pairs of the total sample was computed as;

$$\gamma_{xy} = \frac{398/160 - 0.78 \times 1.29}{2.238 \times 2.432}$$

i.e. $\gamma_{xy} = 0.272$

This is significant at 0.01 confidence level. This correlation coefficient gives a measure of overall reciprocity among sibling pairs. The standard error of γ_{xy} is given as

$$\sigma_r = \frac{1}{\sqrt{N-1}} = \frac{1}{\sqrt{159}} = 0.08$$

The correlation between sibling cordiality and other variables, such as socio-economic, cultural and educational status of the family and the scholastic success of siblings, was then detern ined. This was done by using Pearson Product-Moment furmula given in Guilford (35), as:

$$\gamma^2 = \frac{N\Sigma xy - (\Sigma x)(\Sigma y)}{[N\Sigma x^2 - (\Sigma x)^2][N\Sigma y^2 - (\Sigma y)^2]}$$

where, N is the total sample size, and

x and y are cordiality score and score of any ofthe other variables respectively.

A table giving scores of cordiality and other variables for the subject siblings was prepared, and is given at Annexure-X in the appendix. Other relevant parameters needed in the computation of γ were also computed and given in this annexure. Then taking x for sibling cordiality variable and y for any one of the other variables (socio-economic, cultural or educational level of the family, or scholastic success of the sibling) at a time, the γ values were computed. The results obtained are given below.

Correlation between variables		γ-*value*
sibling cordiality and socio-economic status of the family	(γ_{12})	0.29*
sibling cordiality and cultural status of the family	(γ_{13})	0.09
sibling codiality and educational level of the family	(γ_{14})	0.19*
sibling cordiality and scholastic success of the siblings	(γ_{15})	0.39*

Note : Asterisk (*)indicates significant values at 0.01 confidence level.

These results showed that except for cultural status variable, which indicated almost no correlation, all other variables, namely the socio-economic status, educational level of family and scholastic success of the siblings had correlation with sibling cordiality of varying degrees. The correlation with scholastic success was the highest. To analyse this particular finding further, correlations between scholastic success and cordiality of older and younger siblings were separately computed using the values from Annexure-X in the appendix. The following results were obtained;

Correlation between variables		*γ-value*
cordiality score and scholastic success of older siblings	(γ_{26})	0.44*
cordiality score and scholastic success of younger siblings	(γ_{37})	0.50*
cordiality score of older sibling and scholastic success of younger sibling	(γ_{48})	0.67*
cordiality score of younger sibling and scholastic success of older sibling	(γ_{59})	0.98*

Note: Asterisk (*)indicates significant values at 0.01 confidence level

These results showed that correlation between cordiality of siblings and their scholastic success for both older and younger siblings is less than that between such cordiality and scholastic success of the other sibling of the pair.

The standard error of γ-correlation obtained as above for different variables were computed by using the formula,

$$\sigma_\gamma = \frac{1-\gamma^2}{\sqrt{N-1}}$$

The results are given below:

Correlational value	*Standard error*
γ_{12}(0.29)	0.05
γ_{13}(0.09)	0.06
γ_{14}(0.19)	0.05
γ_{15}(0.39)	0.05
γ_{26}(0.44)	0.06
γ_{37}(0.50)	0.06
γ_{48}(0.67)	0.043
γ_{59}(0.98)	0.003

4.8 SIZE OF THE FAMILY AND THE SIBLING CORDIALITY

In order to examine the relation between the size of the family, decided by the number of siblings in a family, and the cordiality of siblings to one another, χ^2 test of independence was employed. Following steps were involved.

Sibling families according to the number of siblings in a family were grouped out of the total sample of subject siblings. The cordiality score of the siblings grouped as above were taken from Annexure-VI of the appendix and the means of these cordiality scores were computed for each of such groups. The results obtained are given in Table-4. XV below.

TABLE 4.XV

Size of the Family and Means of their Sibling Cordiality Score

Size of family	*Number of families in the total sample*	*Mean*
Two-child families	19	47.63
Three-child families	42	42.14
Four-child families	36	40.43
Five-child families	27	39.16
Six and more child families	36	41.27

Three cordiality levels, viz. low (cordiality scores 16 to 36), medium (cordiality scores 37 to 48) and high (cordiality scores 49-55) were chosen. A chart showing distribution of the frequencies in the total sample of cordiality levels of siblings in the families of different sizes was drawn as shown in Figure-4.2 (page 102). As seen from this figure, the total number of cells in rows and columns were 5 and 3 respectively and thus the degrees of freedom were 8. The χ^2 value was computed by using the formula from McCall (57), given as:

$$\chi^2 = \sum_{J=1}^{r} \sum_{K=1}^{C} \frac{(O_{jk} - E_{jk})^2}{E_{jk}}$$

where, r is the number of rows in Figure-4.2 (r=5),

C is the number of columns in Figure-4.2 (o=3),

O_{jk} is the observed frequency in a cell corresponding to the intersection of jth row and kth column,

E_{jk} is the expected frequency in a cell corresponding to the intersection of jth row and kth column,

$E_{jk}=S_j S_k/N$, where

S_j is the total score for jth row,

S_k is the total score for kth column,

N is the sample size (N=320)

Using the values of the above parameters from Figure-4.2, the value of χ^2 was obtained as 10.09. This was non-significant at 0.05 level of confidence. This meant that the cordiality among siblings is not infiuenced by the number of siblings in a family. Also, Table-4.XV (page 99) suggested that as the number of siblings in the family increased the sibling cordiality went down.

4.9 INTERPRETATION OF FINDINGS

A review of the findings of this research indicated in sections 4.4 through 4.8 is presented in this section.

(a) It was seen that so far as the more strict judgement of the analysis of variance is concerned, sex and birth-order showed a significant interaction at 0.05 confidence level and age difference, as a main effect tended to approximate towards it. This interaction showed that the older brothers had the least favourable attitude toward their younger siblings, whereas the younger brothers showed the highest regard for their elder brothers. There was no such difference in the mutual relationships of younger and older sisters. Thus, variance in cordiality between brothers was observed to be greater than that among sisters. Age difference also

Number of siblings in a family

O_{jk}=Observed frequency score,

E_{jk}=Expected frequency score,

j=number of row,

K=number of column and

χ^2=Chi square

Scores	*Cordiality level (cordiality score range)*									
	O_{jk} *Low*	E_{jk} *(16-38)*	χ^2	O_{jk} *Medium*	E_{jk} *(37-48)*	χ^2	O_{jk} *High (49-55)*	E_{jk}	χ^2	ΣO_{jk}
2	5	9.4	2.06	26	22.3	0.61	7	6.3	0.07	38
3	16	20.7	1.07	52	49.4	0.14	16	13.9	0.32	84
4	20	17.8	0.27	42	42.3	0.0	10	1.19	0.30	72
5	20	13.3	3.38	28	31.7	0.43	6	8.9	0.94	54
6+	18	17.8	0.0	40	42.3	0.13	14	11.9	0.37	72
ΣO_{jk}		79			188			53		$320\Sigma=10.09$
										$\Sigma_{ij}=10.09$

Fig.—4.2: Distribution of the total sample in families according to the number of siblings and their cordiality level. 10.09 was not significant at 0.05 level.

contributed towards a difference in mutual adjustment among siblings; a large difference (of more than two years) being more favourable to cordiality than an age difference of less than two years.

(b) The t-test for difference between means of the cordiality scores of subject sibling groupings according to their age, sex and birth-order difference indicated that none of the three factors had a telling effect on sibling relationships. A surprising result which contrdicted the current notion that girls show softer behaviour in relation to other siblings regardless of sex had not been borne out by the t-test of Means. Interactions were examined by a visual inspection of Means in four-celled diagrams involving sex, age and birth-order in 2x2 combinations. The results of these not only reinforced the findings under 3-way analysis of variance but suggested that when the age difference was small (less than two years) and the child older, he/she would be less cordial towards the other sibling than when he/she was more than two years younger than the other sibling. In an overall view it appeared expectedly that youngers had a slight edge in cordiality over the olders less of sex regardand age difference.

(c) The issue of reciprocity of cordiality among siblings had been examined by the three-way analysis of variance and by correlation between cordiality score of sibling pairs. The analysis of variance of reciprocity score did not indicate that there were any significant configurations in inter-sibling relations under the factors of age, sex and birth-order or their double or triple interactions. The correlation of cordiality scores between the two siblings of the sibling pairs of the total sample gave a γ value of 0.27 which was significantly higher than zero at 0.01 confidence level. This showed that whereas age, sex and birth-order did not contribute differentially towards sibling relationships, there was a minor order of reciprocity operating among pairs of

siblings. This meant that the response to cordial acts, attitude and motives of one sibling was only in approximately 9 to 10 per cent of cases matching and parallel in quality and quantity. Obviously then inter-sibling relationship is not a simple case of equal 'give and take' but has several additional and ancillary determinants including aspects of personality like intelligence, temperament, interests and typological tendency.

(d) The results of correlational analysis showed that except for cultural status variable, which indicated no correlation with sibling cordiality, all others namely, socio-economic status and educational status of the family and scholastic success of the siblings had correlations of a minor order with sibling cordiality. The degree of inter-sibling correlation for these factors was not high but significantly different from 0 at 0.01 level. This would suggest that the popular idea that sibling relation in culturally, well-endouded families would be more cordial is not correct. It was found that cultural pursuits in no way affect the mutual relation among siblings in an overall view. A some-what similar finding was that if the members of the family were generally well educated, this would have no serious impact on the inter-sibling behaviour, except probably in about five per cent of cases which is the level attained by the related covariance. Again, the notion that socio-economic depression would accentuate hardships and interfere with sibling cordiality by rivalries for petty gains is shown to be not operative in more than about ten per cent of cases at the most. Therefore, it seems that regardless of whether the family is socio-economically affluently or indigently placed, the siblings will by and large share the fortunes alike, and are not likely to have mutual bickering among them.

The most interesting finding which is directly germane to this research was that the correlations of scholastic success and sibling cordiality for olders and youngers among pairs of

siblings came out as quite high. These were the highest γ's among all those investigated among environmental variables. This shows that sibling cordiality is a factor of considerable strength operating in favour of good school results not necessiarly as a direct cause but as an indirectly related one. It did, however, show a covariance of nearly 99 per cent in the scholastic success for one group. It was hypothesised on the basis of a hunch that γ between sibling cordiality and scholastic success might differ since it would be more rewarding for the younger sibling than the older one who could act as an informal tutor to the younger sibling. To examine this issue further four types of correlations were calculated as shown below:

Cordiality score of older sibling	— Scholastic success of the same sibling	γ=0.44
Cordiality score of younger sibling	— Scholastic success of the same sibling	γ=0.50
Cordiality score of older sibling	— Scholastic success of paired younger sibling	γ=0.67
Cordiality score of younerg sibling	— Scholastic success of paired older sibling	γ=0.98

These findings formed the crux of the relationship between sibling cordiality and its possible educational implications. The increasing γ_s show that the relationship between high level of cordiality of an individual sibling and his/her scholastic success for both younger and older siblings is less than that between such cordiality and the scholastic success of the other sibling the of pair. It appeared that if the other sibling is cordial the first one would show a better school standing. At first sight this result suggested that the older sibling being cordial would help the younger in curricular work, but this explanation was challenged by the fact that the γ between younger's cordiality and the school success of the older member of the pair was 0.98 whereas that of older's cordiality and scholastic success of the younger was only 0.67. To explain this, it is stated that

since correlation does not prove causation but only a functional relationship, it is likely that among sibship a high regard and consideration goes with school success which is the criterion of respectability among siblings at their age. Thus the natural regard and esteem which the younger has for the older is reinforced by the respect the older's school success elicts. Intelligence could in this situation play the role of the intervening variable and in a follow-up research it would be worthwhile exploring these γ_s further on a tripartite basis by the partailling process. There is, however, hardly any dout that school success and sibling cordiality go together; and therefore either one must favourably affect the other or both must be dependent on a third mediating variable like intelligence and other personality factors which constitute what Hull (40) called a 'general scholastic factor.'

(e) Chisquare test of independence of number of siblings in the family and leveis of cordiality gave χ^2 value of 10.09 for 8 degrees of freedom which was non-significant at 0.05 level. This finally tested out the question whether the presence of several other siblings in a family of the pair picked in the sample affected their relationship. Though this formal check proved negative, a trend was clearly in evidence in the means of cordiality scores of siblings for families with increasing number of siblings surrounding which influence the pair. This suggested that as the number of sibling increased, the average cordiality went down. There was only one exception found in case of six-children families, where the cordiality among siblings was higher than that for families with lesser number of siblings. This seems to suggest that in cases of very large families, the older siblings act as parent-surrogates resulting in increase in cordiality between younger sibling and the parent-surrogate sibling.

In conclusion, it can be said that factors like age, sex and birth-order difference, and number of siblings which are

congenital and so unalterable except possibly the last one, and environmental ones like socio-economic condition of family, educational and cultural level of members thereof, do not seriously affect sibling cordiality. Nor is it greatly reciprocated between a pair. The factors which may materially improve or reduce such cordiality may be personal, such as the several aspects of personality. The degree of relationship between scholastic success and sibling cordiality as observed, shows the importance of siblings in the educational progress of a child. Since the whole personality of the growing child any youth is subjected to the deep psychological influence of not only the parents but also siblings who provide him/her with an abiding psychological climate in the home where he/she spends the largest part of his/her day, the importance of inter-sibling relationship can not be ignored. Therefore, both from the view-point of academic performance and proper personality development, it would be necessary to take into account inter-sibling relationships and the factors operative thereon. This is the main theme of this research.

The hypotheses of the present research were:

(i) Age-difference between siblings does not have any bearing on the cordiality between siblings.

(ii) Sex difference between siblings does not have any bearing on the cordiality between siblings.

(iii) Difference in birth-order of siblings does not have any bearing on the cordiality between siblings.

(iv) Socio-economic and cultural status of the family are not related to the cordiality between siblings.

(v) Cordiality among siblings does not have a bearing on the scholastic success of the siblings.

(vi) Cordiality among siblings does not have a bearing on the number of siblings in the family.

Out of the above, as seen from the findings reported above, statistically the hypothesis of (v) above has been rejected, whereas the rest have been accepted. However, in respectof hypotheses at (i), (iii), (iv) (only socio-economic status included) and (vi) above, interpretation of means of cordiality scores of siblings reveal some relationship with their applicable factors.

5

Summary of Findings and Educational Implications

5.1 SUMMARY OF FINDINGS

The findings of this research were based on the data collected by the researcher from the chosen sample of sibling population which represented a cross-section of the urban school going children in the government schools of the metropolitan town of Delhi. For this, a self made questionnaire was used by the researcher which gave (i) a measure of cordiality of behaviour and attitude of each sibling, (ii) data regarding income, social and cultural life and the educational level of the family of the siblings, (iii) index of the siblings' success, and (iv) the total number of siblings in the family together with their particulars of congenital factors of age, sex and birth-order status.

The questionnaire contained three sections,viz. B, C and D out of a total of seven, which provide a composite data on cordiality of the siblings. The reliability of a composite of these sections was therefore determined using the KR-21 approximate formula and Spearman-Brown Prophecy formula. It gave a consistency reliability of 0.81 which was quite high. The reliability of section D of the questionnaire, which consisted of projective type of incomplete stories to be completed by the

siblings, was checked separately by using the contingency coffi-cient and Spearman-Brown Prophecy formula. This gave an internal consistency-reliability of 0.64 which was resaonably high for projective test of this type. The other sections of the quationnaire, viz. A,E,F and G gave the other factual data abut the siblings and their family.

The subject siblings were grouped according to the main differences due to age, sex and birth-order factors.

A 3-way analysis of variance of $2\times2\times2$ factorial design was applied to study inter-sibling cordiality as a function of age, sex and birth-order difference between the subject siblings. The analysis was applied on a reduced sample with first 15 siblings selected from each of the eight sub-groups defined by age, sex and bith-order difference. The following summarises the results obtained.

It was found that interaction of only sex and birth-order were significant at 0.05 level giving an F-ratio of 5.35, and that the main effect of age difference was approaching that critical level, F-ratio being 3.74. All other factors and their interaction came out as non-significant.

In the hope that the larger sample may give the F-ratio to mature into significance for other sources of variance, a similar 3-way analysis of variance was applied to the complete sample with 40 siblings in each of the eight sub-groups of the total sample. The F-ratio for interaction of sex and birth-order came out as 3.89, which was significant at 0.05 level, and that of main effect of birth-order as 2.53 approaching that critical level.

This analysis of variance therefore merely confirmed the largely negative results obtained with the analysis on a reduced sample.

Thus, so far as strict judgement of the analysis of variance was concerned, it was seen that sex and birth order showed a significant interaction at 0.05 level and age diffence as the main effect also approximate toward it. This interaction showed that the elder brother had the least favourable attitude toward their younger siblings, whereas the younger brothers showed the highest regard for their elder brothers. No such difference in

the mutual relationships of younger and older sisters was observed. That is to say, the variance in cordiality between brothers was found to be greater than that among sisters. Age difference also contributed towards a differedce in mutual adjustment among siblings; a large differencebeing more favourable to cordiality than a small difference of less than two years. These results were found to reinforce the findings of study of means of cordiality scores as discussed below.

The means and standard deviations of the cordiality scores of the siblings in each of the three main groups according to the age, sex and birth-order were calculated and gave the following results:

Factor		*Mean*	*Standard deviation*	*t-value*
Age	Large age difference	41.75	6.78	1.3
	Small age difference	40.72	7.45	(non-significant)
Sex	All brothers	41.26	7.13	0.06
	All sisters	41.26	7.15	(non-significant)
Brith-order	All olders	40.58	6.83	1.65
	All youngers	41.89	7.38	(non-significant)

The t-test for difference between means in the above three sub-groups indicated that none of the three factors of age, sex and birth-order difference had a telling effect on sibling relationships.

A study of the integraction of these three factors by using the means of cordiality scores derived for different sub-groups defined by age, sex and birth-order revealed the following:

Age difference vs birth-order:

Older siblings with small age difference had a much less cordical feelings for their opposite member (regardless of his sex) than the younger siblings had for their elder brother and sister when the age difference was large. The trend also showed that the cordiality of younger siblings was slightly

greater than that of older ones. Also, large age difference showed better cordiality than small age difference.

Age difference vs sex:

So far as sex was concerned, it did not have any significant effect on sibling relationship. However, it appeared that large age difference did favour, regardless of sex, a more cordial relationships than that expected among the contemporaries with a small age difference.

Sex diefference vs birth-order:

This reinforced the findings that younger siblings had slightly better cordiality towards their elders than viceversa, and that sex made no difference in inter-sibling relationship. Also, older and younger sisters showed similar mutual attitudes; but among brothers older ones showed much less cordiality in return for a much higher cordiality they had from their younger ones.

The correlation of cordiality scores between the two siblings of the sibling pairs of the total sample was computed using the pearson formula. This gave a value of correlation coefficient of 0.272 which was significant at 0.01 level. This, however, showed an overall relatively less reciprocity between the siblings, though significantly different from zero.

The Pearson Product Moment formula was used to compute the correlation between the sibling cordiality and score of other variables, such as socio-economic status, cultural status and educational level of the family and the scholastic success of the siblings. The following results were obtained:

Correlation between sibling cordiality and socio-economic status of the family	=0.29
Correlation between sibling cordiality and cultural status of the family	=0.09
Correlation between sibling cordiality and educational level of the family	=0.19
Correlation between sibling cordiality and scholastic success of siblings	=0.39

These results showed that except for cultural status variable, which indicated no correlation, all other variables namely, the socio-economic status and educational level of the family and scholastic success of the siblings, had correlation of a minor order with sibling cordiality. That is to say, the cultural status of the family did not show any bearing on the inter-sibling relationships. A somewhat similar finding was that the educational level of the family had no serious impact on the inter-sibling behaviour except in about five per cent of the cases. Similarly, the socio-economic status of the family did not seem to have the appreciable *euect* on the inter-sibling relations, except in about ten per cent of the cases.

A more interesting finding was that the correlation between the scholastic success and the sibling cordiality was high. This showed that sibling cordiality is a factor of considerable strength operating in favour of good school results not necessarily as direct cause but as an indirectly related one.

To analyse this further, the correlation between scholastic success and cordiality of older and younger siblings were separately computed. The following were the results obtained:

Correlation between cordiality score and scholastic success of older siblings	=0.44
Correlation between cordiality score and scholastic success of younger siblings	=0.50
Correlation between cordiality score of older siblings and scholastic success of younger siblings	=0.67
Correlation between cordiality score of younger sibling and scholastic success of older siblings	=0.98

These correlation in the increasing order showed that the relationship between high level of cordiality of a sibling and his/her scholastic success for both order and younger siblings was less than that between such cordiality and the scholastic

success of the other sibling of the pair. Thus, it meant that if the other sibling of the pair was cordial, the first one showed a better school standing, and this works more favourably for the scholastic success of the order sibling if the younger sibling was highly cordial

The aspect of reciprocity of cordiality between siblings of a pair was examined by correlation between cordiality score of sibling pairs and the 3-way analysis of variance.

The analysis of variance did not indicate that there were any significant configurations in inter-sibling relations under factors of age, sex and birth-order or their interactions. However, the correlation between cordiality score of paired siblings of all categories was seen to be 0.27 which was significantly higher than zero at 0.01 level of confidence. Findings of inter-sibling cordiality computation and those of the analysis of variance separately as reported above, showed that whereas age, sex and birth-order did not contribute differently towards sibling relationships, there was a minor order of reciprocity operating among pairs of siblings. This meant that the response of cordial acts, motives, attitudes of one sibling was only in approximately nine to ten per cent of cases matching and parallel in quality and quantity.

In order to see the relation between the size of family, indicated by the number of siblings in a family, and the cordiality of siblings to one another χ^2 test of independence was employed. The χ^2 value of 8 degrees of freedom was obtained as 10.9 which was non-significant at 0.05 levels of confidence. This meant that the cordiality among siblings was not influenced by the number of siblings in a family. Though this formal check proved negative, a trend was clearly seen in evidence in the means of cordiality scores computed for families with increasing number of siblings. The means of cordiality scores of siblings in order of increasing number of sibling were given on next page.

"Size of family and their calculated mean value as indicated on next page suggested that as the number of siblings increased, the average cordiality went down. There was one exception found in this. The mean of cordiality of siblings in six children families was higher than that of siblings in lesser number of

Size of family	*Mean values*
With two children	47.63
With three ceildren	42.14
With four children	40.43
With five children	39.16
With six children and more	41.27

children families. This appeared to suggest that in large children families, the elder siblings start acting as parent-surrogate and this improves the cordiality among one sibling and the parent-surrogate sibling of the family.

5.2 COMPARISON WITH THE FINDINGS OF PREVIOUS RELATED STUDIES

Most studies reported which are related to this area had dealt with the variables of age, sex and birth-order of children in the family as a parameter, while in the present study also these three variables were taken as basic dependent variables. But the studies elesewhere linked variables to the personality development of the child whereas in the present research the effect of these factors on the cordiality between siblings had been judged. This is elaborated in the followings

In the present research the attitude of younger siblings was found to be more positive toward their elder siblings. Also, when there existed a large age difference between siblings their cordiality was higher than of those having small age difference. While studying the effects of birth-order on personality development of the child, Koch. Weller and Warren and Adler were of the view that the first-borns tend to be more conforming and dependent tnan the later borns, and they are more susceptible to group pressure and more withdrawn and are prone to angry outbursts. Further, in a study of the relationship between ordinal position and adolescent and the adjustments of siblings in a family. Redly found that statistically first-born, subjects were most mal-adjusted closely followed by the middle-born and that the second-born were least maladjusted.

In the present research it was found that sex difference did not have a sinificant effect on sibling relationship, whereas Koch, Sutton-Smith and Rosenberg in their studies found that sex difference among siblings was of great significance in deciding their personality formation when it was taken with ordinal position or with age difference of siblings.

Other variables taken up for study in the present research were size of the family, socio-economic status, cultural status of the family and scholastic success of the siblings.

The present research revealed that the socio-economic status of the family has a minor order of relation with the sibling cordiality to one another, whereas Teagarden, Friends and Mussen described the socio-economic status to influence the physical, moral and mental development and personality adjustment of children.

It was found in the present research that in general, the scholastic success of siblings have direct bearing on sibling relationship. Also, whereas younger siblings were found to have high positive attitude towards their elder siblings, the latter siblings achieve better scholastic success. some studies done abrod also confirm this. Sutton-Smith found that high school teachers identify first-borns as superior students not because of higher levels of inteligence but because of strong motivation, seriousness, adult orientation and susceptibility to external pressure. Altus also reported that within families more first-borns achieve success in adult life than later-borns. Schoonover, in his study of relationship of intelligence and achievement to birth-order, sex and age of the siblings utilising longitudinal data, however, found no significant differences between older and younger siblings in intelligence or achievements. Schoonover and Koch also found that in intellectual development and achievement, children with male siblings scored higher than those with female siblings.

The size of the family in the present research was found to have inverse effect on the sibling cordiality too one another except when the size was to large, for example six children families. Statistically, however, it showed no significant effect. Bossard and Boll have described that the children of single

child families develop a different personality pattern from those in two child or three-child families and these in-turn differ from those in families with more number of children. Bossard in his study of large family system reported that range and extent of contacts between siblings of a family vary inversely with the time span between the births of siblings. This is in line with the finding of the present research that in case of very large families the inter sibling relationships are more cordial. Murlidharan, on the other hand, found that when children from one, two, three and more child family units are compared, children from more than three-child family units show significantly less of problem behaviour than the children from other types of family units. The results suggested that smaller family system is more conducive to the development of problem behaviour. Few other researches were concerned with the effect of size of the family on scholastic achievement of the siblings which was not studied in the present research.

5.3 EDUCATIONAL IMPLICATIONS

The importance of siblings in the educational and psychological development of children and youth is a basic postulate of this research.

Its findings demonstrate that contrary to popular notion and expectation, cultural and educational level of the family do not in a material way determine the relations between siblings in it. Socio-economic condition does show a small link and may be due to the troubles arising out of sharing of scarce resources. The number of siblings in the family show a trend of inverse relationships with sibling cordiality, and this would suggest both an improvement in the socio-economic condition of the deprived classes of people and the promotion of a programme for family planning.

The findings also show that statistically mutual cordial relations are not determined by factors of age difference, sex and birth-order of the siblings except in a single combination where sex and birth-order showed a relationship. A sisterly comradeship existed in girl sibship, and in boys the elder tended to

ignore the younger who would be inclined in some measure to hero-worship him and try to win his patronage.

A low degree of reciprocity of disposition between pairs of siblings and various types of categories of siblings showed no difference in this matter.

Educationally sibling relations would show too types of effects. Firstly, they contribute to the family atmospher as much as, if not more, than the parents, since a child is destined to have siblings as his unavoidable companions; he cannot choose them as he does his friends at school. Therefore, the affective and emotional life of the child will be in good measure determined by sibling relations. The effect of this kind of inescapable conditioning on the development of the personality of the child during its most impressionable and formative years can hardly be questioned. Since correlation coefficient of cordiality score of sibling pairs was only 0.27, it means that it can be improved. It has been shown that few of the congenital and environmental factors have a tangible effect on sibling cordiality. so far as socio-economic condition is concerned, social action and government policies should be directed to mend matters for those who suffer such handicaps. But possibly cordiality among siblings is dependent on personality factors beyond the purview of this research, which merely shows that certain settings of a congenital nature are conductive to cordiality. In view of these findings, the school could utilize the forum of parent-teacher associations to 'educate' the parent also regarding the need to improve inter-sibling relations as a matter of deliberate policy. Their own actions and discriminative treatment may be partly inhibitive of the growth of sibling cordiality, and if they are aware of the problem and its significance they may take stock of these situation afresh and try to ameliorate conditions likely to be in the way. They will then more easily see the point of this kind of redress when they know that sibling cordiality is well and positively correlated with scholastic attainment. This is the second type of effect sibling relationship produces on the child.

Findings here clearly show that good sibling relationship both for the elder and the younger members of the sibling pair

show high positive coefficient of correlation with scholastic attainment. The more commonly accepted and recognized function of the school is imparting of knowledge and skill in certain subjects. Development of character and personality are important but less tangible in results. Therefore, from this point of view also it is necessary that it should try to improve by active social work in problematic families, inter-sibling cordiality.

5.4. LIMITATIONS OF THE STUDY

A few areas of the study in the context of the present research that have not been considered for study have been identified, and are mentioned in the following.

In the present study only the relationship between cordiality of older and/or younger siblings with their scholastic success has been seen, when the correlation of scholastic success with the age and sex difference of the siblings could also have been included.

In a similar way, the correlation between size of the family and the cordiality of siblings towards one another has been seen, when the correlation of cordiality with the sex make-up of the family, *i.e.*, the families with majority of girls or boys or with equal distribution of sex of the siblings, could have been also studied.

The present study also excluded the study of relationship between size of the family and scholastic success of their siblings.

In a like manner, the correlation of socio-economic status of the family with the cordiality score of siblings has been studied, whereas study of the relationship between different levels of socio-economic status of the family and the sibling cordiality was left out.

The data collected for the present research were neither on the basis of religious groupings nor linguistic groupings to see their effect on different types of sibling relationships.

5.5. SUGGESTIONS FOR FURTHER STUDIES IN THE FIELD

Further research is needed to uncover the more potent factors in sibling cordiality. It would be desirable to see sibling cordiality in relation to personality factors. Also, a case study approach to acute cases, both where cordiality is exceptionally high and low, will give insight into 'depth' factors which may explain the phenomenon in clearer terms.

A correlational study involving intelligence, socio-economic and educational level of the family and sibling cordiality will also be revealing as to the exact degree of contribution of sibling cordiality to scholastic success.

Yet another avenue of approach is to investigate the composite cordiality measure comprising factual material, conscious level perception and 'depth' motives further by obtaining separate measures on full length tests for each and inter-correlating them to see how far they constitute a single variable

The present study has been conducted at the city level. It will be quite an interesting and revealing investigation to study sibling relationships in rural areas and those among joint families.

Lastly, the areas of study listed as 'limitations of the present study' in section 5.4 can also be taken up using the data already collected for a further study of sibling relationships. Also, the data collected were only from the siblings in the secondary and senior secondary government schools of Sarojini Nagar area of South Delhi were largely families of government servants of different categories reside. Thus the siblings belonging to business class families and those studying in public schools were not included in the present study. An extension to the data can thus be made to cover these above class of siblings also for study.

Summary

The importance of siblings (in the sense of brothers and sisters born of the same parents) as constituents of the typical human family (which is the primary unit of human society every where) cannot be over-emphasized in the formative influences in the growth of children and youth. The present research is originated from this primary postulate. Its objective was to study sibling relationships in the complex setting of selected congenital and environmental factors and the degree of its contact with scholastic success in a cross section of school going urban children.

In the present research, the effect of three major factors of age, sex and birth-order of siblings in the emergence of the favourable or unfavourable relationships between the siblings was studied. Also, environmental factors of socio-economic status, cultural status and educational level of the family were taken up to see their effect on sibling relationship. The main focus here in study of sibling relationships was on studying cordiality of inter-sibling relationships as a result of all these factors. The possible relationship of degree of cordiality and scholastic success of the children were subsequently examined.

The study was confined to siblings *i.e.*, brothers and sisters having same parents, and study of their relationships was limited to the 'dyad' relationship form. Only nuclear families with two or more number of children were the subjects of study. The subject siblings were from an age group of 12-18 years studying in class VI to XII.

he variables for study were;

measure of cordiality for individual siblings,

measure of reciprocity between sibling pairs,

measure of socio-economic status of the family,

measure of cultural status of the family,

measure of educational level of the family, and

measure of scholastic success of individual siblings.

While the variables were selected on the basis of positive 'hunches' regarding ramifications of sibling relationships, statistically the null hypothesis was adopted in respect of each of these variables having their effect on sibling relationships.

The hypotheses put forward for testing were:

(i) Age difference between siblings does not have any bearing on the cordiality between siblings.

(ii) Sex difference between siblings does not have any bearing on the cordiality between siblings.

(iii) Dsfference between birth-order of siblings does not have any bearing on the cordiality between siblings.

(iv) Socio-economic and cultural status of the family are not related to the cordiality between siblings.

(v) Cordiality among siblings does not have a bearing on the scholastic achievements of the siblings.

(vi) Cordiality among siblings does not have a bearing on the number of siblings in a family.

A random sample from a group of senior secondary and secondary government schools of Sarojini Nagar area in South Delhi was drawn for study. The sample consisted of sibling pairs of immediate older and younger siblings. A total of 160 such pairs were selected. These were grouped according to the differences of their age (large age difference, more than 2 years,

and small age difference, less than 2 years), sex (brothers and sisters) and birth-order (older and younger siblings). This grouping produced, under a two-way relationship for each of these factors, $2\times2\times2=8$ sub-groups, each having 20 sibling pairs giving a total of 320 siblings.

The data on cordiality of behaviour and attitude of each sibling, income, profession, social life, culture and education of the family of subject siblings, total number of members in their family and their scholastic success were obtained by a self-prepared questionnaire. A set of simple questions and statements were used in different sections of the questionnaire to elicit data on these factors. Sections B, C and D of the questionnaire were specifically prepared to yield a measure of cordiality of siblings. These elicited factual responses of sibling behaviour towards other sibling of the pair, attitude and perception of siblings at their conscious level, and unconscious level urges of siblings using projective technique of story completion respectively.

Scoring of the data obtained from siblings by using appropriate weightings produced the variables mentioned earlier for study.

A composite of sections B, C and D, which gave a measure of cordiality of siblings, was first taken to see its consistency-reliability. Application of KR-21 and Spearman and Brown Prophecy formulae gave a consistency-reliability of 0.81 which was very high. Consistency-reliability of section D was 0.64 reasonably high for a projective test.

In order to analyse the data available on the variables in eight different sub-groups according to age, sex and birth-order difference of the siblings, the statistical treatment employed included:

(i) Analysis of variance of cordiality and reciprocity of the siblings,

(ii) Means of cordiality scores and their significant differences in different sub-groups using t-test.

(iii) Calculation of Pearson γ for correlation between cordiality of siblings and score of variables such as socio-economic status, cultural status and educational level of the family and scholastic success of siblings,

(iv) Chi square test of independence between size of the family and cordiality score of siblings.

A three-way analysis of variance of $2\times2\times2$ factorial design was applied to study the inter-sibling cordiality as a function of factors age, sex and birth-order of siblings, The analysis indicated that the interaction of only six and birth-order was significant at 0.05 level and that the main effect of age difference was approaching that critical level. All other factors and their interaction came out as non-significant.

The t-test for difference between means in the sub-groups defined by age, sex and birth-order difference of siblings indicated that none of these factors were significant, and thus did not show a telling effect on sibling relationships. However, a study of the interaction of these three factors by using the means of cordiality scores under different sub-groups was subsequently made. This revealed that the elder brothers had the least favourable attitude toward their younger siblings, whereas the younger brothers showed the highest regard for their elder brothers. No such difference in the mutual relationships of younger and older sisters was observed. Age difference also contributed towards a difference in mutual adjustment omong siblings; a large difference being more favourable to cordiality than a small difference of less than two years.

These findings also reinforced the results obtained in the analysis of variance.

The correlation of cordiality scores between the two siblings of the sibling pairs of the total sample gave a value of 0.27. This showed an overall relatively less reciprocity between siblings though significantly different from zero (it was significant at 0.01 level). The analysis of variance of reciprocity score, however, indicated that none of the factors of age, sex and birth-order or their interactions were significant.

Correlation between sibling cordiality and other variables of scores of socio-economic status, cultural status and educational level of the family and the scholastic success of siblings were computed using Pearson Product Moment formula. The results showed that except for cultural status variable, which indicated no correlation, all other variables had correlation of a minor order. That is, the cultural status did not show any bearing on sibling relationship, Educational level of the family also had no serious impact on inter-sibling behaviour except in about five per cent of cases. Similarly, socio-economic status of the family did not seem to have appreciable effect on inter-sibling relations except in about ten per cent of cases.

A more interesting finding, which is directly germane to this reserarch, was that correlation between scholastic success of the siblings and the sibling cordiality was highest. To analyse this further, the correlation between scholastic success and cordiality of older and younger siblings, taking both or one at a time were sparately computed. This showed that the correlation of cordiality score of younger sibling with scholastic success of older sibling was the highest, almost 0.99, when compared to that of cordiality score of older sibling with scholastic success of younger sibling, which was 0.67, also very high. These results indicate the importance of sibling cordiality in their academic achievements.

A Chi square test of independence between the number of siblings in a family and their cordiality indicated that those have a non-significant bearing. However, a trend was observed in the means of cordiality score of siblings of different numbers in a family, that as the number of siblings increases in a family their cordiality goes down except perhaps when there are very large number of them, say six siblings.

The conclusion is that sibling relations, being important in the educational and psychological development of the children, cannot be taken for granted as being conventionally 'good'. Their texture and intimacy vary. It is for consideration of social agencies, including the school to see that siblings interact to mutual advantage, for happy homes should make

for a happy society. Other variables of economic welfare and educational refinement and family size which may bear relations to sibling harmony in certain settings should invite attention of state agencies for improvement.

Most studies reported in this area have dealt with the effect of the factors, considered in this research, on the personality development of siblings. Whereas, as seen above, this research has dealt with their effects on sibling relationships.

Present study could be extended to cover siblings in rural areas, joint families or those belonging to business community and studying in public schools to see the relevant effects. Also, a case study approach to extreme cases will give an insight into 'depth' factors which may explain this phenomenon further A correlational study involving intelligence, socio-economic and educational level of the family and sibling cordiality will also be revealing as to the exact degree of contribution of sibling cordiality to scholastic success.

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ANNEXURE I

A Break-up of Different Categories of Schools in the Four Educational Districts of the Union Territory of Delhi

DISTRICT NORTH

Agency	*Zone I*				*Zone II*				*Zone III*				*Grand Total*		
	Boys		*Girls*		*Boys*		*Girls*		*Boys*		*Girls*				
	U	*R*	*U*	*R*	*U*	*R*	*U*	*R*	*U*	*R*	*U*	*R*	*U*	*R*	*Total*
								Seenior Secondary							
Govt.	11	5	9	6	7	9	7	4	14	—	11	—	59	24	83
Aided	2	1	2	—	—	2	1	—	8	—	5	—	18	3	21
N.D.M.C.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Central	1	—	—	—	—	—	—	—	—	—	—	—	1	—	1
United	11	—	—	—	1	—	—	—	1	—	—	—	3	—	3
Total	15	6	11	6	8	11	8	4	23	—	16	—	81	27	108

(*Contd.*)

Secondary

Govt.	3	3	4	1	7	1	2	4	3	—	3	—	22	9	31
Aided	—	1	—	—	—	—	—	—	1	—	1	—	2	1	3
Unaided	2	—	—	—	1	2	—	—	2	—	—	—	5	2	7
Total	5	4	4	1	8	3	2	4	6	—	4	—	29	12	41

Middle

Govt.	9	7	9+3*	2	6	7	9+5*	3+3*	4	—	7+4*	−+1*	44+12*	19+4*	63+16*
Aided	—	—	—	—	—	1	—	—	1	—	3	—	4	1	5
N.D.M.C.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unaided	1	—	—	—	1	—	—	—	1	—	—	—	3	—	3
Total	10	7	9+3*	2	7	8	9+5*	3+3*	6	—	10+4*	−+1*	51+12*	20+4*	71+16*
Grand Total	30	17	24+3*	9	23	22	19+5*	11+3*	35	—	30+4*	−+1*	161+12*	59+4*	220+16*

*Indicates Boys Schools in Girls Zone

Source: Statistical Branch, Directorate of Education, Delhi Administration, 1978.

District East

Agency	Zone IV				Zone V				Zone VI				Grand Total		
	Boys		Girls		Boys		Girls		Boys		Girls				
	U	R	U	R	U	R	U	R	U	R	U	R	U	R	Total
Senior Secondary															
Govt.	16	—	14	—	6	—	12	—	5	—	5	—	58	—	58
Aided	5	—	2	—	13	—	11	—	12	—	14	—	57	—	57
N.D.M.C.	—	—	—	—	—	—	—	—	1	—	2	—	3	—	3
Central	—	—	—	—	—	—	—	—	1	—	—	—	1	—	1
Unaided	—	—	—	—	1	—	1	—	1	—	3	—	6	—	6
Total	21	—	16	—	20	—	24	—	20	—	24	—	125	—	125
Secondary															
Govt.	9	—	8	1	4	1	4	—	3	—	4	—	32	2	34
Aided	2	—	3	—	6	—	1	—	7	—	1	—	20	—	20
Unaided	2	—	1	—	—	—	1	—	1	—	—	—	5	—	5
Total	13	—	12	1	10	1	6	—	11	—	5	—	57	2	59

(Conntd)

Middle

Govt.	9	4	11+8*	+1*	10	—	6	—	5	—	7+3*	—	48+11*	4+1*	52+12*
Aided	1	—	2	—	1	—	2	—	2	—	1	—	9	—	9
N.D.M.C.	—	—	—	—	—	—	—	—	1	—	1	—	2	—	2
Unaided	5	—	1	—	1	—	—	—	4	—	—	—	11	—	11
Total	15	4	14+8*	+1*	12	—	8	—	12	—	9+3*	—	70+11*	4+1*	74+12*
Grand Total	49	4	42+8*	1+1*	42	1	38	—	43	—	38+3*	—	252+11*	4+1*	258+12*

*Indicates Boys Schools in Girls Zone

Source: Statistical Branch, Directorate of Education, Delhi Adminstration, 1978.

District South

	Zone VI				Zone VIII				Zone IX				Grand Total		
	Boys		Girls		Boys		Girls		Boys		Girls				
	U	R	U	R	U	R	U	R	U	R	U	R	U	R	Total
							Senior Secondary								
Govt.	10	—	11	—	8	1	9+1*	1	15	2	14	1	67+1*	5	72+1*
Aided	5	—	6	—	3	—	2	—	2	—	3	—	21	—	21
N.D.M.C.	—	—	—	—	—	—	—	—	1	—	—	—	1	—	1
Central	—	—	—	—	2	—	—	—	4	—	—	—	6	—	6
Unaided	2	—	4	—	—	—	2	—+1*	1	—	3	—	12	—+1*	12+1*
Total	17	—	21	—	13	1	13+1*	1+1*	23	2	20	1	107+1*	5+1*	112+2*
							Secondary								
Govt.	5	—	1	—	5	3	4+1*	2	4	1	—	—	19+1*	6	25+1*
Aided	1	—	2	—	1	—	1	—	—	—	1	—	6	—	6
Unaided	3	—	1	—	1	—	—	—	5	—	1	—	11	—	11
Total	9	—	4	—	7	3	5+1*	2	9	1	2	—	36+1*	6	42+1*

(Contd.)

Middle

Govt.	5	—	5	—	12	6	5+5*	1	2	1	4+3*	—	33+8*	8	4+8*
Aided	4	—	1	—	—	—	—	—	2	—	—	—	7	—	7
Unaided	5	—	2	—	—	—	2	—	7	—	1	—	17	—	17
NDMC	3	—	—	—	—	—	—	—	4	—	1	—	8	—	8
Total	17	—	8	—	12	6	7+5*	1	15	1	6+3*	—	65+8*	8	73+8*
Grand Total	43	—	33	—	32	10	25+7*	4+1*	47	4	28+3*	1	208+10*	19+1*	227+1*

*Indicates Schools in Girls Zone

Source: Statistical Branch, Directorate of Education, Delhi Administration, 1978.

District West

Agency	Zone X				Zone XI				Zone XII				Grand Total		Total
	Boys		Girls		Boys		Girls		Boys		Girls				
	U	R	U	R	U	R	U	R	U	R	U	R	U	R	
Senior Secondary															
Govt.	7	5	8	6	15	—	18	—	8	—	9	—	65	11	76
Aided	1	—	—	—	3	—	—	—	8	—	8	—	20	—	20
N.D.M.C.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Central	2	1	—+1*	—	1	—	—	—	—	—	—	—	3+1*	1	4+1*
Unaided	—	—	1+1*	—	2	—	1	—	6	—	—	—	10+1*	—	10+1*
Total	10	6	9+2*	6	21	—	19	—	22	—	17	—	98+2*	12	110+2*
Secondary															
Govt	6	6	1+1*	10	7	—	5	—	5	—	2	—	26+1*	16	42+1*
Aided	3	—	1	—	2	—	—	—	3	—	1	—	10	—	10
Unaided	2	—	1	—	2	—	1	—	—	—	1	—	7	—	7
Total	11	6	3+1*	10	11	—	6	—	8	—	4	—	43+1*	16	59+1*

(*Conid.*)

	Middle															
Govt.	2	6	—+1*	2+5*	9	—	—13+4*	—	5	—	7+3*	—	36+8*	8+5*	44+13*
Aided	—	—	—	—	—	—	1	—	4	—	2	—	7	—	7
N.D.M.C.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unaided	4	—	—	—	4	—	1	—	—	—	1	—	10	—	10
Total	6	6	—+1*	2+5*	13	—	15+4*	—	9	—	10+3*	—	53+8*	8+5*	61+13*
Grand Total	27	18	12+4*	18+5*	45	—	49+4*	—	39	—	31+3*	—	194+11*	36+5*	230+16*

*Indicates Boys Schools in Girls Zone.

Source: Statistical Branch, Directorate of Education, Delhi Administration, 1978.

ANNEXURE—II

A list of schools in different geographical areas covered in Zone Nos. 4, 9 and 11.

DISTRICT EAST

ZONE IV BOYS

Senior Seeondary Schools (Govt.)
Urban

1. B.R. Shahdara, Delhi-32
2. Chander Nagar, Delhi-51
3. Gandhi Nagar, No. 1 Delhi-31
4. Geeta Colony, Block No. 13, Delhi-31
5. Gandhi Memorial, Shahdara, Delhi-32
6. Ghonda, Delhi-53
7. G.T. Road, Shahdara, Delhi-32
8. Jheel Kuranja No. 1, Delhi-31
9. Jhilmil Colony, Delhi-32
10. Krishan Nagar, (Adult), Delhi
11. Kailash Nagar, Delhi-31
12. Krishan Nagar, Delhi-31
13. Nand Nagri, Delhi
14. Seelampur, Delhi-53
15. Seemapuri (Co-edn.), Delhi-32
16. Vivek Vihar (Co-edn.) Delhi-32

(Contd.)

Aided Schools

Urban

1. D.A.V. No. 1, Gandhi Nagar, Delhi-31
2. D.A.V. No. 2, Shankar Nagar, Delhi
3. Ram Rattan Geeta (Co-edn.) H.S.S., Shankar Nagar, Delhi
4. Mukherjee Memorial, G T. Road Shahdara, Delhi-32
5. S.D. Shahdara, Delhi.

Unaided Schools

Nil

Secondary Schools (Govt.)

Urban

1. Biswas Nagar (Co-edn.), Delhi
2. Brahampuri, Ghonda, Delhi-53
3. Gandhi Nagar No. 2, Delhi-31
4. Jafrabad (Co-edn.)
5. Jheel Kuranja No. 2, Delhi-31
6. Laxmi Nagar, (second shift), Delhi
7. Shahdara, Delhi-32
8. Shankar Nagar, Delhi-31
9. Shivaji Park, Delhi-32

Aided Schools

Urban

1. Alok Bharti (Co-edn.) Khureji Khas, Delhi-51
2. Jain Boys, Shahdara, Delhi-32

Unaided Schools

Urban

1. Green Field, Vivek Vihar, Delhi-32
2. Gandhi Harijan (co-edn.), Brahampuri, Ghonda, Delhi-53

Rural

Nil

Source: Statistical Branch, Directorate of Education, Delhi Administration, 1978.

DISTRICT EAST

ZONE IV GIRLS

Senior Secondary Schools (Govt.)

1. Bhola Nath Nagar, Shahdara, Delhi-32
2. B.M. Shahdara, Delhi-32
3. Chandar Nagar, Delhi-51
4. Gandhi Nagar No. 1, Delhi-31
5. Gandhi Nagar No. 2, Delhi-31
6. Gandhi Nagar No. 3, Delhi-31
7. G.T. Road, Shahdara, Delhi-32
8. Geeta Colony, Block No. 13, Delhi-31
9. Ghonda, Delhi-53
10. Jhilmil Colony, Delhi-32
11. Kailash Nagar (Gandhi Nagar) Delhi-31
12. Krishan Nagar, Delhi-51
13. Seelampur, Delhi-53
14. Shivaji Park, Shahdara, Delhi-32

Rural

Nil

Aided Schools

Urban

1. Moti Ram Memorial Girls HSS, Shahdara, Delhi-32
2. Ratan Devi Arya Girls HSS, Krishan Nagar, Delhi-51

Rural

Nil

(*Contd.*)

Unaided Schools

Nil

Secondary Schools (Govt.)

1. Bhola Nath Nagar
2. Geeta Colony, Rani Garden
3. Jheel Kuranja, Rajagarh, Delhi-31
4. Kanti Nagar (Near Krishan Nagar)
5. Laxmi Nagar, Delhi-51
6. Nand Nagari, Delhi
7. Shankar Nagar, Delhi-31
8. Brahmpuri, (Ghonda)

Rural

1. Babarpur

Aided Schools

Urban

1. Baijnath Arya Girls HSS, Shahadra, Delhi-32
2. Guru Nanak Girls HSS, Gandhi Nagar, Delhi-31
3. Jan Kalyan, Bhajanpura, Delhi. (Co-edn.)

Unaided Schools

1. Aryachin Bharti, Balbir Nagar, Shahdara, Delhi-32. (Co-edn)

Source: Statistical Branch, Directorate of Education, Delhi Administration, 1978.

DISTRICT SOUTH

ZONE IX BOYS

Senior Secondary Schools (Govt.)

Urban

1. Laxmibai Nagar, New Delhi-23
2. Mehrauli No. 2, New Delhi-30
3. Moti Bagh-I, New Delhi-21
4. Moti Bagh, II, New Delhi-21
5. Nauroji Nagar, New Delhi-16
6. Netaji Nagar New Delhi-22
7. R.K. Puram, Sector II, New Delhi-22
8. R.K. Puram, Sector III, (I Shift), New Delhi-22
9. R.K. Puram, Sect. III (II Shift), New Delhi-22
10. R.K. Puram, Sector VI (I Shift) New Delhi-22
11. R.K. Puram, Sector VII, New Delhi-22
12. Sarojini Nagar No. 1, New Delhi-23
13. Sarojini Nagar No. 2, New Delhi-23
14. Sarojini Nagar No. 3, New Delhi-23
15. Sarojini Nagar No. 4, New Delhi-23

Rural

1. Mahipalpur, New Delhi-37
2. Rajokri (Co. edn.), New Delhi-38

Aided Schools

Urban

1. Bidhan Chandra (Co-edn.) Moti Bagh, New Delhi.
2. V.N. Bengali (Co-edn.) Sarojini Nagar, New Delhi-23

(*Contd.*)

Unaided Schools

Urban

1. Delhi Public School (Co-edn.) Sector XII, R.K. Puram, New Delhi.

N.D.M.C.

Urban

1. Nav Yug (Co-edn.) I-Avenue, Sarojini Nagar, New Delhi-23

Central School

1. Central School I.I.T. Hauz Khas, New Delhi-16
2. Central School, Sector II, R.K. Puram, New Delhi-22
3. Central School, Sector VIII, R.K. Puram, New Delhi-22
4. Central School, Sect IV, R.K. Puram (Masjid Moth), New Delhi

Secondary Schools (Govt.)

1. R.K. Puram, Sector 4 (second shift,) New Delhi-22
2. R.K. Puram (Co. edn,), New Delhi-22, Sec. XII
3. Sarojini Nagar No. 5, New Delhi-23.
4. Qutab (Mehrauli) No. 1, New Delhi.
5.

Rural

1. Ghitorni, New Delhi-33

Aided Schools

Nil

Unaided Schools

Urban

1. Modern School, Vasant Vihar, New Delhi.
2. General Raj's School, C-18, Green Park Extn.
3. Guru Harikishan Public School, Vasant Vihar, New Delhi.
4. Holy Child Auxillum (Girls) School, Sec. XII, R.K. Puram New Delhi-22.
5. St. Mary's (Co-edn.), School, Safdarjung Enclave, New Delhi

Rural

Nil

Urban

Nil

Source: Statistical Branch, Directorate of Education, Delhi Administration, 1978.

DISTRICT SOUTH

ZONE IX GIRLS

Senior Secondary Schools (Govt.)

Urban

1. Green Park Extension, New Delhi-16
2. Laxmibai Nagar, New Delhi-23
3. Mehrauli, New Delhi-37
4. Moti Bagh, New Delhi-21
5. Nanakpura, New Delhi-21
6. Netaji Nagar, New Delhi-22
7. R.K. Puram, No. 1, Sector II. New Delhi-22
8. R.K. Puram, No. 2, Sector V (I Shift), New Delhi-22
9. R.K. Puram, No. 3, Sector VII, New Delhi-22
10. R.K. Puram, No. 4, Sector VI (I Shift), New Delhi-22
11. Safdarjang Enclave, New Delhi-6
12. Sarojini Nagar, No. 1, New Delhi-23
13. Sarojini Nagar, No. 2, New Delhi-23
14. Sarnjini Nagar, No. 3, New Delhi-23

Rural

1. Mahipalpur, New Delhi-37

Secondary Schools (Govt.)

Urban

Nil

Rural

Nil

(Contd.)

AIDED SCHOOLS

Urban

1. D.T.E.A.(Co-edn.), Laxmibai Nagar New Delhi-23
2. D.T.E.A. (Co-edn.), Moti Bagh, New Delhi-21
3. D.T.E.A. (Co-edn.), R.K. Puram, New Delhi.

Rural

Nil

Urban

1. Jain Girls Sec. School, Green Park Ext., New Delhi

Rural

Nil

UNAIDED SCHOOLS

Urban

1. Army Public School (Co. edn.), Upper Ridge Road, Dhaula Kuan, New Delhi-10.
2. Mothers, International (Co-edn.), Sh. Aurobindo Ashram, New Delhi-37
3. St. Anthony (Co-edn.), C/6, Safdarjang Development Area, Hauz Khas, New Delhi-16

Rural

Nil

Ubran

1. Carmel Convent, Diplomatic Enclave, New Delhi-1

Rural

Nil

Source: Statistical Branch, Directorate of Education, Delhi Administration, 1978.

DISTRICT WEST

ZONE XI BOYS

Senior Secondary Schools Government

Urban

1. Ashok Nagar (Tihar West) New Delhi-18
2. Chand Nagar New Delhi
3. Hari Nagar, New Delhi-18
4. Karampura, New Delhi-15
5. Madipur, New Delhi-26
6. Moti Nagar, No. 1, New Delhi-15
7. Moti Nagar, No. 2, New Delhi-15
8. Punjabi Bagh, New Delhi-26
9. Rajouri Garden, No. 1, New Delhi
10. Rajouri Garden, No. 2, New Delhi
11. Ramesh Nagar, New Delhi-15
12. Subhash Nagar, No. 1, New Delhi
13. Tagore Garden, No. 1, New Delhi-27
14. Tilak Nagar, No. 1, New Delhi-18
15. Tilak Nagar, No. 2, New Delhi.

Secondary Schools

Urban

1. Basai Darapura, New Delhi
2. J.J. Colony, Tagore Garden, New Delhi-27
3. Karampura (Adult). New Delhi
4. Khyala, New Delhi
5. Subhash Nagar, No. 2, New Delhi
6. Tagore Garden, No. 2, New Delhi-27
7. Tilak Nagar, No. 3, New Delhi

(Contd.)

AIDED SCHOOLS

Senior Secondary Schools

Urban

1. Bhai Biba Singh (Co-edn.), Khalsa Moti Nagar, New Delhi
2. S.B. Mills, (Co-edn.), Shivaji Marg, New Delhi-5
3. Sukho Khalsa (Co-edn.), Fateh Nagar, New Delhi-18

Urban

1. S.D. Gujarat, Kirti Nagar, New Delhi
2. Swami Shivanand (Co-edn.) HSS Punjabi Bagh, New Delhi

UNAIDED SCHOOLS

Secondary Schools

Urban (Delhi Scheme)

1. Hans Raj Model, Punjabi Bagh New Delhi-26

All India Pattern

2. N.C. Jindal (Co-edn.) Public School, Punjabi Bagh, New Delhi-26.
1. New Era (Co-edn.) Public School, Rajouri Garden, New Delhi
2. Sarswati Bal Mandir, L-Block, Hari Nagar, New Delhi.

CENTRAL SCHOOLS

Urban

1. Central School, Tagore Garden, New Delhi-27

Source: Statistical Branch, Directrate of Education, Delhi Administration, 1978.

DISTRICT WEST

ZONE XI GIRLS

Senior Secondary Schools Government

Urban

1. Ashok Nagar (Tihar West), New Delhi-18
2. Basai Darapura New Delhi-15
3. Chand Nagar, New Delhi
4. Hari Nagar, New Delhi-18
5. Karampura, New Delhi-15
6. Kirti Nagar, New Delhi-15
7. Madipur, New Delhi-26
8. Moti Nagar, No. 1, New Delhi-15
9. Moti Nagar, No. 2, New Delhi-15
10. Punjabi Bagh, New Delhi-26
11. Rajori Garden No. 1, New Delhi
12. Rajori Garden No. 2, New Delhi
13. Ramesh Nagar, New Delhi-27
14. Subhash Nagar, No. 1, New Delhi
15. Tagore Garden, No. 1, New Delhi
16. Tilak Nagar, No. 1, New Delhi
17. Tilak Nagar, No. 2, New Delhi
18. Tilak Nagar, No. 3, New Delhi

Rural

Nil

Secondary Schools

Urban

1. Industrial Area, Karampura, New Delhi-15
2. J.J. Colony, Tagore Garden, New Delhi
3. Khayala, New Delhi
4. Subhash Nagar No. 2, New Delhi-27
5. Tagore Garden, No. 2, New Delhi-27

(*Contd.*)

AIDED SCHOOLS

Nil

UNAIDED SCHOOLS

Urbrn (All India Pattern)

1. Holy Child School, Tagore Garden. New Delhi-27

Urban

1. Cambridge Foundation (Co-edn.) J-13/45, Rajouri Garden, New Delhi-26.

Source: Statistical Branch, Directorate of Education Delhi Admidistration, 1978

ANNEXURE-III

QUESTIONNAIRE
ON

A Study of Sibling Relationships and their Psychological and Educational Implications

Introduction

Dear Respondent,

This Questionnaire consists of seven different sections (A through G) of questions. Please answer all the questions carefully and quietly. Your name and the answers given by you will be kept confidential. In this way a research programme of the University related to an understanding of the problems of school-going students, like you, and their solutions will be greatly advanced through your cooperation.

YOURS INVESTIGATOR,
SHARAD RAJ ARORA

Section A

Name: .....

Age: .....

Class: .....

Section: .....

Name of the School: .....

Father's Name: .....

Status of yaur famly: .....Joint/Single

Instructions:

Mention below the names and ages of your brothers and sisters (including yourself) according to their birth order. Put a circle (0) around the serial number of your own name.

Sl. No.	*Name (in order of birth)*	*Age (in years)*	*Sex (Male/Female)*
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			

Section B

Instructions:

Given blow are some questions concerning your elder/ younger brother or elder/younger sister. Answer these questions about only one of your elder or younger brother or sister by writing 'Yes' or 'No' against each questions. Give the name, age, class, section and the name of the school of the brother or sister about whom questions are answered.

Name: .....

Age: .....

Class: .....

Section: .....

Name of the School: .....

Sl. No.		*Yes/No*
1.	I like to study with him/her	.....
2.	I like to play with him/her	.....
3.	I like to discuss and solve problems related to my studies with him/her	.....
4.	I like to go to the Market with him/her	.....
5.	I like to go for Pinic with him/her	.....
6.	I like to share my secrets with him/her	.....
7.	I like to take help from him/her whenever required	.....
8.	I like to give my dearest belongings to him/her	.....
9.	I like to stay with him/her in the absence of my parents	.....
10.	I like to take my important decisions in consultation with him/her	.....
11.	I like to report his/her mistake of misconduct to elders	.....
12.	I like to enter into arguments with him/her	.....
13.	I feel sad if he/she is insulted	.....
14.	I like meeting him/her after long separation	.....
15.	I like to listen to ill said of him/her	.....
16.	I feel happy on his/her achievements	.....

Section C

Instructions

Answer each of the following statements, whether you agree or disagree with them, by writings 'Yes', if you agree, or a No', if you disagree, against each statement.

Sl. No.		*Yes/No*
1.	It is essential to have brothers and sisters in the home	.....
2.	We get cooperation from brothers and sisters in our work	.....
3.	Brothers and sisters are jealous of the achievements of each other	.....
4.	We get consolation from brothers and sisters in sorrows	.....
5.	We get help from Brothers and sisters when required	.....
6.	Brothers and sisters often quarrel with each other	.....
7.	We hope to be rescued from misfortunes by brothers and sisters	.....
8.	We get distrubed in our work by brothers and sisters	.....
9.	Parents affection gets divided and diluted among brothers and sisters	.....
10.	Other friends are not necessary with brothers and sisters in the home	.....

Section D

Instructions

Given below are eight incomplete stories. Complete them with the of your imagination describing in as much detail as possible in the space given below each story.

Story No. 1.

Rekha and Amit are sister and brother. Rekha is 18 and Amit 12 years of age. Once they went together to a fete arranged in their school. Rekha had ten rupees with her while Amit had only four rupees with him.....

Story No. 2.

Rita and Geeta are two sisters. Rita is 16 and Geeta 18 years old. Their father is in Government service. Once he was transferred to a different place during December month. Rita and Geeta were therefore placed in a hostel for a few months in the same room and with a third girl.....

Story No. 3.

Shobha and Ashok are sister and brother. Shobha is 12 and Ashok 18 years old. Once they went together to Delhi to spend their summer vacations after their examinations. Ashok used to smoke after hiding himself from his parents. Shobha knew this habit of Ashok but she had not told their parents of this. Once Shobha fought with Ashok. On this after she returned from Delhi, Shobha decided.....

Story No. 4:

Mohan and Sohan are two brothers. Mohan is 13 years while Sohan 15 years of age. Once they went on a tour to visit places of historical interest. Mohan had keen interest in seeing places of historical importance while Sohan did not have so much interest in this.....

Story No. 5:

Rachna and Pankaj are sister and brother. Rachna is 16 Pankaj 14 years old. Both are studying in the same class. Once Rachna left her class and went to a movie with one of

her friends. Their father came to know about it from some one else. When he asked Pankaj about this, Pankaj said that .....

Story No. 6:

Asha and Madhu are two sisters. Asha is 18 Madhu 12 years of age. Both used to go daily for an evening walk. Asha on the way used to meet her boy friend daily. Their parents did not know about it. Once their parents suspected on Asha about this. They called Madhu and asked her about Asha. Madhu replied that.....

Story No. 7:

Rakesh and Rupa are brother and sister. Rakesh is 16 and Rupa 14 years old. Both are studying in the same school. Once Rakesh fought with one of his classmates and beat him up. On this Rakesh was not allowed to enter the class for four days. On these days Rakesh, as usual, used to come with Rupa but used to wander here and there and did not go to the school. Their parents did not know about it but after two days, one of the friends of Rakesh told their parents about it. When they asked Rupa about this, she infomed the parents that.....

Story No. 8:

Ajay and Vijay are two brothers. Their age is 12 and 18 years respectively. Both have great interest in playing and watching on the cricket match. Once one of the friends of Ajay gave him only one ticket for India V/S England Cricket test match being played in Delhi. Ajay was very much pleased to get this ticket, but then got into a thought about Vijay as to whether.....

Section E

Instructions:

Fill up the blank columns given below which are related to the economic status of your family.

1.

Sl. No.	*Names of the earning members*	*Monthly income of each*	*Occupation*
1.			
2.			
3.			
4.			
5.			

2. Anyother source of income in the family

3. Total number of dependents in the family

Section F

Instructions

Fill up the blank columns given below which deal with the educational and cultural statuts of the members of your family.

1.

Sl. No.	*Names of the family members*	*Relation with you*	*Educational Qualifications in the from of highest examination passed*
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

2. Names of a few fine arts are given below Give details of the fine arts in which each member of your family has interest.

Painting/Sculpture/Music/Dance/Drama/Acting/ Writing/ Others

Sl. No.	*Name of the members*	*Relation with you*	*Name of the art(s) of interest*	*Appreci-ate only*	*Practice only*	*Impor-tant contri-bution in that art*
1.						
2.						
3.						
4.						
5.						
6.						
7.						
8.						

3. Describe other achievements of any member (s) of your family, if any,

4. Answer the following questions here

   (a) Name daily newspapers which are subscribed by your family.

1.	
2.	
3.	
4.	
5.	

(b) Which of the above newspapers you read most (give in order of preference)

1. .....
2. .....
3. .....
4. .....

(c) Name the weekly and monthly magazines subscribed by your family

Weekly	*Monthly*
1.	.....
2.	.....
3.	.....
4.	.....

(d) Which type of article(s) of these magazines you read most.

1. .....
2. .....
3. .....
4. .....

(e) Indicate (by inserting a tick√) the type of books read by your family members from the following.

Social/Historical/Adventurous/Biography/Science/ Detective or Crime/Romantic/Fairy Stories/Others.

(f) Name four authors of the books read by the members of your family in about last two years

Name of books	*Name of the author*
1.	.....
2.	.....
3.	.....
4.	.....

(g) Indicate (by inserting a tick√) if your family members read the above books by

Purchasing/from others/library membership

Section G

Instructions:

Describe here details of your scholastic success by giving total percentage of marks and subjectwise marks obtained in your last examination

Sl. No.	*Name of the Subject*	*Total marks obtained/ out of*	*Percentage of marks obtained*
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
Total			

ANNEXURE—IV

Steps for Calculating Mean (M) and Standard Deviation (σ) in Section B of the Questionnaire

Score	*Frequency*	*Coded value*	fx'	x'^2	fx'^2
16	10	4	40	16	160
15	21	3	63	9	189
14	61	2	122	4	244
13	42	1	42	1	42
12	76	0	0	0	0
11	28	—1	—28	1	28
10	49	—2	—98	4	196
9	11	—3	—33	9	99
8	14	—4	—56	16	224
7	2	—5	—10	25	50
6	6	—6	—36	36	216
5	0				
4	0				
3	0				
2	0				
1	0				

$N=\Sigma f=320$, $\Sigma fx'=+6$, $\Sigma fx'^2=1448$ $I=1$

$$M = A + \left(\frac{\Sigma fx'}{N}\right)I$$

$$= 12 + \frac{6}{320}$$

$$= 12 + .02$$

$$M = 12.02$$

$$\sigma = I\sqrt{\frac{\Sigma fx'^2}{N} - \left(\frac{\Sigma fx'}{N}\right)^2}$$

$$\sigma = \sqrt{\frac{1448}{320} - (.02)^2}$$

$$\sqrt{4.52 - (.02)^2}$$

$$\sigma = 2.13$$

Steps for Calculating Mean (M) and Standard Deviation (σ) in Section C of the Questionnaire

Score X	*Frequency f*	*Code value x'*	*fx'*	*x'²*	*fx'²*
10	67	2	134	4	268
9	55	1	55	1	55
8	105	0	0	0	0
7	34	−1	−34	1	34
6	44	−2	−88	4	176
5	9	−3	−27	9	81
4	4	−4	−16	16	64
3	0	−5	−0	25	0
2	2	−6	−12	36	72
1	0	−7	0	49	0

$N = \Sigma f = 320$, $\Sigma fx' = 12$, $\Sigma fx'^2 = 750$, $I = 1$

$$M = A + \left(\frac{\Sigma fx'}{N}\right) I$$

$$= 8 + \frac{12}{320}$$

$$= 8 + 0.04$$

$$M = 8.04$$

$$\sigma = I \sqrt{\frac{\Sigma fx'^2}{N} - \left(\frac{\Sigma fx'}{N}\right)}$$

$$= \sqrt{\frac{750}{320} - \left(\frac{12}{320}\right)^2}$$

$$= \sqrt{\frac{750}{320} - (0.04)^2}$$

$$= \sqrt{2.34 - .0016}$$

$$= \sqrt{2.34}$$

$$\sigma = 1.53$$

Steps for Calculating Mean (M) and Standard Deviation (σ) In Section D of the Questionnaire

Score X	*Frequency* f	*Code value* x'	fx'	x'^2	fx'^2
16	32	5	160	25	800
15	18	4	72	16	288
14	44	3	132	9	396
13	14	2	28	4	56
12	50	1	50	1	50
11	27	0	0	0	0
10	43	−1	−43	1	43
9	27	−2	−54	4	108
8	18	−3	−54	9	162
7	17	−4	−68	16	272
6	7	−5	−35	25	175
5	7	−6	−42	36	252
4	12	−7	−84	49	588
3	2	−8	−16	64	128
2	2	−9	18	81	162
1	0	−10	0	0	0
$N = \Sigma f = 320$,		$\Sigma fx' = 28$,	$\Sigma fx'^2 = 3480$,		$I = 1$

$$M=A+\left(\frac{\quad}{N}\right)$$

$$11+\frac{28}{320}$$

$$11+0.088$$

$$\sigma=\sqrt{\frac{\Sigma fx'^2}{N}-\left(\frac{\Sigma fx'^1}{N}\right)}$$

$$=\sqrt{\frac{3480}{320}-(0.088)^2}$$

$$=\sqrt{1.88-0.0078}$$

$$=\sqrt{1.88}$$

$$\sigma=\ 1.37$$

ANNEXURE—V

Diagrams for Correlation between Seven Different Pairs of Stories Successively taken from Story Numbers 1 to 8.

1. Correlation between Story 1 and 2

Score Story 1—2	*0*			*1*			*2*			ΣO_{jk}	$\Sigma \chi^2$
	O_{jk}	E_{jk}	χ^2	O_{jk}	E_{jk}	χ^2	O_{jk}	E_{jk}	χ^2		
2	5	7.9	1.06	6	10.6	2.0	130	122.5	0.46	141	3.52
1	6	5.6	0.03	11	7.5	1.63	83	86.9	0.18	100	1.84
0	7	4.4	1.54	7	5.9	0.21	65	68.6	0.19	79	1.94
ΣO_{jk}	18			24			278			320	
$\Sigma \chi^2$			2.63			3.84			0.83		7.30

(Contd.)

2. Correlation between Story 2 and 3

Scores Story 2—3		*0*			*1*			*2*		Σ	Σ
	O_{jk}	E_{jk}	χ^2	O_{jk}	E_{jk}	χ^2	O_{jk}	E_{jk}	χ^2	O_{jk}	χ^2
2	42	44.3	0.10	51	58.7	1.20	91	81.1	1.20	184	2.50
1	12	10.3	0.30	16	13.7	0.40	15	18.9	0.80	43	1.50
0	23	22.4	0	35	29.6	1.0	35	41	0.90	93	1.90
ΣO_{jk}	77			102			141			320	
$\Sigma\chi^2$			0.40			2.6			2.9		5.90

O_{jk}=Observed score,
E_{jk}—Expected score,
j=number of row,
χ^2=Chi square
k=number of column

1. Correlation between Story 3 and 4

Score / *Story* 3—4	*0*			*1*			*2*			Σ O_{jk}	Σ χ^2
	O_{jk}	E_{jk}	χ^2	O_{jk}	E_{jk}	χ^2	O_{jk}	E_{jk}	χ^2		
2	37	53.7	5.2	21	26.9	1.3	133	110.4	4.6	191	11.1
1	17	17.4	0	19	8.7	0	26	35.8	2.7	62	2.7
0	36	18.8	15.7	5	9.4	2.1	26	38.7	4.2	67	220
ΣO_{jk}		90		45			185			320	
$\Sigma\chi^2$			20.9			3 4			11.5		35.8

(*Contd.*)

2. Correlation between Story 4 and 5

Score Story 4—5	*0*			*1*			*2*				
	O_{jk}	E_{jk}	χ^2	O_{jk}	E_{jk}	χ^2	O_{jk}	E_{jk}	χ^2	ΣO_{jk}	$\Sigma \chi^2$
2	36	39	0.2	27	36	2.25	127	115	1.25	190	3-7
1	7	9	0.44	11	8	1.13	25	26	0.04	43	1.61
0	23	18	1.39	23	49	3.06	41	52	2.33	87	6.78
ΣO_{jk}	66			61			193			320	
$\Sigma \chi^2$			2.03			644			3.62		12.09

O_{jk}=Observed score,
E_{jk}=Expected score,
j=number of row,
χ^2=Chi square
k=number of column

1. Correlation between Story 5 and6

Score Story 5—6	*0*			*1*			*2*			ΣO_{jk}	$\Sigma \chi^2$
	O_{jk}	E_{jk}	χ^2	O_{jk}	E_{jk}	χ^2	O_{jk}	E_{jk}	χ^2		
2	34	47	3.6	15	23	2.8	122	101	14.4	171	20.8
1	11	16	1.6	16	8	8.0	32	35	0.3	59	9.9
0	43	25	13.0	12	12	0	35	53	6.1	90	19.1
ΣO_j	88			43			189			320	
$\Sigma \chi^2$			18.2			10.8			20.8		49.8

(Contd.)

2. Correlation between Story 6 and 7

Score Story 6–7		0			1			2		Σ O_{jk}	Σ χ^2
	O_{jk}	E_{jk}	χ^2	O_{jk}	E_{jk}	χ^2	O_j	E_{jk}	χ^2		
2	22	42	9.52	18	25	1.96	100	73	10.0	40	21.48
1	20	23	0.39	27	14	12.07	28	39	3.10	75	15.56
0	54	32	15.13	13	19	1.89	38	54	4.74	105	21.76
ΣO_{jk}	96			58			166			320	
$\Sigma\chi^2$			25.04			15.92			17.84		58.8

O_{jk}—Observed score,
E_{jk}=Expected score,
j=number of row,
χ^2=Chi square
k=number of column

1. Correlation between Story 7 and 8

Scores / *Story*	*0*			*1*			*2*			ΣO_{jk}	$\Sigma \chi^2$
	O_{jk}	E_{jk}	χ^2	O_{jk}	E_{jk}	χ^2	O_{jk}	E_{jk}	χ^2		
2	51	69	4.7	35	52	5.6	132	97	12.6	218	22.9
1	10	17	2.9	37	13	44.3	8	24	10.7	55	57.9
0	42	15	41.7	5	11	3.3	2	21	17.2	47	62.2
ΣO_{jk}	101			77			142			320	
$\Sigma \chi^2$			49.3			53.2			40.5		143.0

O_{jk}=Observed score,
E_{jk}=Expected score,
j=number of row,
χ^2=Chi square
k=number of column

ANNEXURE VI

Cordiality Score and Reciprocity Socre of Subject Siblings of the Total Sample Under Eight Different Sub-Groups

Group 1: Brother-Brother (More than two years age difference)

Sl. No.	*Name*	*B*	*C*	*D*	*Cordiality Score* S_x & S_y	*Reciprocity Score* $S_x - S_y$
1.	Pramod	15	13.5	16.5	55	10
	Mukesh	15	12	18	45	
2.	Manjit Singh	8	12	18	38	1
	Surender Singh	15	12	12	39	
3.	Mukesh	15	13.5	15	43.5	4.5
	Dinesh	12	13.5	13.5	39	
4.	Bhagwati	14	13.5	18	45.5	6.5
	Ratan	15	10.5	13.5	39	
5.	Ashok	11	12	22.5	45.5	3
	Narendra	14	12	22.5	48.5	
6.	Vinod	14	9	15	38	12.5
	Vipin	16	13.5	21	50.5	
7.	Suneel	10	10.5	6	26.5	10.5
	Virendra	10	9	18	37	
8.	Rajesh	12	12	15	39	12
	Sanjeev	12	15	24	51	

(Contd.)

9.	Parveen	8	9	9	26	22.5
	Naveen	14	15	19.5	48.5	
10.	Suresh	9	9	12	30	23
	Ramesh	14	15	24	53	
11.	Tejpal	12	13.5	4.5	30	15.5
	Jagatjeet	14	15	16.5	45.5	
12.	Anil	7	12	16.5	35.5	7
	Anish	8	12	22.5	42.5	
13.	Anil	10	13.5	16.5	40	10
	Nalin	14	12	24	50	
14.	Ashwani	9	12	21	51	9
	Arun	15	12	15	42	
15.	Mukesh	14	12	15	41	10
	Rajesh	15	12	24	51	
16.	Bhupendra	8	12	10.5	30.5	16.5
	Balgendra	13	10.5	22.5	46	
17.	Suneel	8	12	24	44	2.5
	Sudarshan	12	12	22.5	46.5	
18.	Madhusudan	13	9	16.5	38.5	8.5
	Madhav	14	12	21	47	
19.	Salil	15	15	18	48	2
	Pankaj	14	15	21	50	
20.	Atul	12	15	15	42	0.5
	Amit	10	12	10.5	41.5	

Group 2: Brother-Brother (Two years or less age difference)

21.	Shyam Kapil	14	12	15	41	8
	Ram Kapil	12	10.5	10.5	33	
22.	Sudheer	15	12	16.5	43.5	2.5
	Satyapal	13	15	18	46	

23.	Sanjeev	14	15	21	50	1.5
	Sandeep	14	15	22.5	51.5	
24.	Joginder	8	10.5	6	24.5	17
	Bhupender	13	13.5	15	41.5	
25.	Rajesh	14	13.5	16.5	44	7.5
	Sanjeev	14	15	22.5	51.5	
26.	Narendra	10	12	19.5	41.5	7.5
	Yogendra	10	10.5	13.5	34	
27.	Rajesh	10	10.5	10.5		9.5
	Rakesh	12	12	16.5	40.5	
28.	Anil	12	10.5	18	40.5	0.5
	Manoj	15	15	21	51	
29.	Rajendra	13	9	13.5	35.5	0
	Subhash	10	9	16.5	35.5	
30.	Vijay	6	7.5	3	16.5	22
	Vinod	10	9	19.5	38.5	
31.	Vivek	13	15	18	46	6.5
	Amit	14	12	13.5	39.5	
32.	Sanjay	12	12	24	48	11
	Sunil	13	10.5	13.5	37	
33.	Molay	10	13.5	12	35.5	0.5
	Prolay	12	15	9	36	
34.	Rajkamar	10	15	7.5	32.5	9
	Shailendra	10	12	19.5	41.5	
35.	Vinod Kapoor	12	15	6	33	15.5
	Anil	14	12	22.5	48.5	
36.	Jagdish	13	9	12	34	4.5
	Gulab	13	7.5	9	29.5	
37.	Naresh	15	10.5	21	46.5	3.5
	Rajesh	13	9	21	43	

(Contd.)

38. Vijay	14	13.5	21	48.5	1.0
Chandraman	15	15	19.5	49.5	
39. Manoj	14	12	19.5	45.5	10.0
Shailash	13	10.5	12	35.5	
40. Ajay	13	15	21	49	4.5
Sanjay	13	13.5	18	44.5	

Group 3: Sister-Sister (more than two years age difference)

41. Alka	10	10.5	16.5	37	13
Ranjana	14	12	24	57	
42. Pinky	8	13.5	9	30.5	4
Jyoti	12	12	10.5	34.5	
43. Yash	12	12	12	36	11.5
Lata	16	13.5	18	47.5	
44. Savita	12	12	13.5	37.5	3
Bhagwati	15	13.5	12	40.5	
45. Anjali	13	12	19.5	44.5	4.5
Radha	13	15	21	49	
46. Sangeeta	12	12	12	36	10.5
Neeta	6	7.5	12	25.5	
47. Indu	12	12	21	45	20.5
Neelima	14	9	1.5	24.5	
48. Asha	12	12	22.5	46.5	5
Pushpa	14	13.5	24	51.5	
49. Kusum	9	10.5	22.5	42.0	4.5
Lata	12	10.5	15	37.5	
50. Poonam	11	12	19.5	42.5	4
Neeraj	10	15	13.5	38.5	
51. Mohini	13	10.5	15	38.5	1
Usha	14	10.5	15	39.5	
52. Abha	11	12	21	44	5
Urvashi	13	15	21	49	

53	Anita	14	10.5	21	44.5	1.5
	Rekha	13	12	21	46	
54.	Rita	13	13.5	13.5	40	2
	Kiran	9	9	24	42	
55.	Rachna	13	15	18	46	1
	Anjana	12	10.5	22.5	45	
56.	Vandana	12	12	15	39	6
	Aarti	12	12	21	45	
57.	Damyanti	10	12	24	46	0
	Meenakshi	13	12	21	46	
58.	Gayatri	12	12	22.5	46.5	5.5
	Vandana	13	15	24	52	
59.	Archana	12	9	15	36	6
	Ranjana	12	12	18	42	
60.	Kamlesh	13	15	7.5	35.5	6.5
	Devi	8	9	12	29	

Group 4: Sister-Sister (Two years or less age difference)

61.	Chandra	13	10.5	7.5	31	7
	Manju	12	7.5	4.5	24	
62.	Nirmal	11	12	16.5	39.5	2.5
	Kusumlata	12	13.5	16.5	42	
63.	Rooplakshmi	14	15	22.5	51.5	1.5
	Bharti	14	15	21	50	
64.	Bharti Suri	14	12	16.5	42.5	4.5
	Deepika Suri	14	9	15	38	
65.	Vibha	10	12	10.5	32.5	10
	Asha	6	7.5	9	22.5	

(Contd.)

66. Shashi	12	13.5	10.5	36	3.5
Renu	14	9	16.5	39.5	
67. Renu Bala	10	15	18	43	7
Rama Rani	14	12	24	50	
68. Saroj	15	13.5	24	52.5	1.5
Veena	15	15	24	54	
69. Prabha	11	12	19.5	42.5	26
Neeta	6	3	7.5	16.5	
70. Asha	8	12	15	35	1 5
Lata	14	12	10.5	36.5	
71. Ranjana	13	6	24	43	4
Neerja	15	6	18	39	
72. Veena	14	13.5	6	33.5	8
Vandana	12	7.5	6	25.5	
73. Purnima	12	13.5	16.5	42	16.5
Kanchan	13	10.5	12	35.5	
74. Rekha	14	15	10.5	39.5	6.5
Sheela	12	15	6	33	
75. Sujata	10	13.5	21	44.5	2 5
Sonia	12	15	15	42	
76. Damyanti	12	12	22.5	46.5	10.0
Indira	11	7.5	18	36.5	
77. Vijaylakshmi	15	12	22.5	49.5	8.5
Chandrakanta	11	10.5	19.5	41	
78. Uma Kumari	15	10.5	21	46.5	13
Vijay Kumari	11	9	13.5	33.5	
79. Nerru Jain	12	12	15	39	8
Meenu Jain	14	12	21	47	

80. Anu Sharma	9	10.5	19.5	39	7
Monika	16	10.5	19.5	46	

Groups 5: Sister-Brother (Two years or less age difference)

81. Meena	13	3	6	22	17.5
Durgesh	11	12	16.5	39.5	
82. Suman	10	15	21	46	12 0
Virendra	13	13.5	7.5	34	
83. Sadhna	10	10.5	18	38.5	9.5
Sanjeev	12	15	21	48	
84. Renu	13	13.5	15	41.5	4.5
Rajesh	13	15	18	46	
85. Neeru	9	15	13.5	37.5	4.5
Sanjeev	12	12	9	33	
86. Rama	11	9	16.5	36.5	5
Anil	12	9	10.5	31.5	
87. Reena	13	15	10.5	38.5	5
Sunil	9	15	19.5	43.5	
88. Malti	12	12	7.5	31.5	17.5
Anand	13	13.5	22.5	49	
89. Rita	13	13.5	24	50.5	7.5
Vinit	13	15	15	43	
90. Seema	12	12	13	42	8
Sanjay	13	15	22.5	50.5	
91. Meenakshi	12	12	13.5	37.5	4.5
Mridual Singh	12	13.5	7.5	35	
92. Dolkar	11	12	15	38	3
Tsering Kaul	11	13.5	10.5	35	

(Contd.)

93.	Manjeet Kaur	9	12	16.5	34.5	3
	Satindra	12	12	10.5	34.5	
94.	Sangeeta	11	12	21	44	3
	Ajai	11	15	15	41	
95.	Chaya	12	10.5	15	37.5	4
	Ajit	14	13.5	6	33.5	
96.	Anjana	10	9	18	37	5
	Arun Kumar	15	13.5	13.5	42	
97.	Anju	10	12	19.5	41.5	2.5
	Rakesh	9	13.5	16.5	39	
98.	Sunita	12	13.5	21	46.5	2.5
	Pradeep	11	15	18	44	
99.	Anita	16	15	26	55	3.5
	Anil	14	13.5	24	51.5	
100.	Suneeta	10	12	21	43	6.5
	Subhash	12	13.5	24	49.5	

Group 6: Sister-Brother (More than two years age difference)

101.	Anita	11	15	18	44	7
	Suneel	15	15	21	51	
102.	Bina	14	15	21	50	3
	Vipin	13	15	9	47	
103.	Lakshmi	16	15	15	46	4.5
	Narendra	13	15	13.5	41.5	
104.	Asha	12	15	18	45	2.5
	Manoj	16	15	13.5	44.5	
105.	Manpal	12	15	18	45	8
	Paramjeet	10	10.5	16.5	37	
106.	Seema Mani	14	13.5	18	45.5	6
	Sumesh	8	15	16.5	39.5	

107. Saroj	15	15	24	54	3.5
Sanjeev	13	15	22.5	50.5	
108. Garima	10	9	15	34	2
Sandeep	9	12	15	36	
109. Veena	12	12	15	39	0.5
Rajesh	11	12	16.5	39.5	
110. Rama	13	12	18	43	6
Rajesh	13	12	12	37	
111. Rekha	11	13.5	24	48.5	7.5
Deepak	11	10.5	19.5	41	
112. Kavita	11	6	6	23	12.5
Deepak	13	9	13.5	35.5	
113. Hema	13	13.5	22.5	49	14.5
Shiva	12	9	13.5	34.5	
114. Sangeeta	12	13.5	24	49.5	5.0
Rajeev	10	13.5	21	44.5	
115. Sudha	10	10.5	15	35.5	10.5
Manoj	13	15	18	46	
116. Poonam	14	13.5	21	48.5	13.5
Rajesh	8	15	12	35	
117. Usha	12	9	18	39	12
Tejpal	12	15	24	51	
118. Hansa	10	12	13.5	35.5	1.5
Manoj	10	12	15	37	
119. Hemlata	13	13.5	15	41.5	10.5
Vinod	10	3	18	31	
120. Madhu	8	12	15	35	16
Jaiprakash	12	15	24	51	

(Contd.)

Group 7: Brother-Sister (Two year or less age difference)

121.	Pradeep	15	13.5	13.5	42	1.5
	Renu	12	13.5	15	40.5	
122.	Hariom	11	15	15	41	3
	Madhu	11	12	15	38	
123.	Rakesh	12	12	16.5	40.5	11.5
	Renu	16	15	21	52	
124.	Inder	12	15	24	53	12.5
	Manju	12	10.5	18	40.5	
125.	Madhav	10	13.5	24	47.5	3.5
	Mittali	12	15	24	51	
126.	Diwakar	12	12	12	36	14
	Sushma	14	15	21	50	
127.	Dalveer	12	9	15	36	8
	Charanjeev	14	12	18	44	
128.	Sanjay	11	12	13.5	36.5	7
	Savita	12	13.5	18	43.5	
129.	Raghwansh	6	12	12	30	5.5
	Madhubala	10	10.5	15	35.5	
130.	Charanjit	11	12	18	41	1
	Tajendra	12	12	18	42	
131.	Purusnottam	13	7.5	12	32.5	11.5
	Asha Rani	12	12	11	44	
132.	Ajeet	10	9	12	31	17.5
	Rashmi	14	13.5	21	48.5	
133.	Kulbindra	12	15	21	48	2.5
	Dipika	13	13.5	24	50.5	
134.	Deepak	14	12	18	44	3.5
	Anjali	13	13.5	21	47.5	

135. Sanjeev	11	13.5	15	39.5	8.5
Anita	10	9	12	31	
136. Rajash	14	10.5	18	42.6	6
Neerupma	14	13.5	21	48.5	
137. Ajai	11	9	16.5	36.5	5.5
Monika	10	9	12	31	
138. Ashwani	12	15	24	51	8
Purnima	10	12	21	43	
139. Suneel	6	10.5	12	28.5	8.5
Renu	10	12	15	37	
140. Ashwani	10	13.5	12	35.5	6.5
Anjali	12	15	15	42	

Group 8: Brother-Sister (More than two years age difference)

141. Hareesh	8	9	15	32	10
Meena	12	12	18	42	
142. Ashok	14	12	21	47	6
Geeta	14	15	24	53	
143. Mukesh	12	12	21	45	8
Lata	14	15	24	53	
144. Arun	10	12	18	40	7
Aarti	14	15	18	47	
145. Ramratan	13	12	24	49	7
Sarita	15	9	18	42	
146. Rajeev	16	13.5	21	50.5	0.5
Rashmi	14	15	21	50	
147. Rajendra	10	9	13.5	32.5	4.5
Harvindra	10	9	16	37	

(*Contd.*)

148.	Susheel	12	12	15	37	6.5
	Geeta	12	13.5	18	43.5	
149.	Ramesh	10	12	15	37	4
	Uma	12	10.5	10.5	33	
150.	Atul	14	12	21	47	3
	Anjana	14	12	18	44	
151.	Dinesh	12	12	18	42	2
	Sangeeta	14	12	18	44	
152.	Ramkrishna	9	9	13.5	31.5	2
	Suman	10	9	10.5	09.5	
153.	Balbir	10	9	13.5	32.5	6.5
	Daljit	11	12	16	39	
154.	Sanjay	14	13.5	18	45.5	6.5
	Seema	16	15	21	52	
155.	Ravinder	10	9	15	34	13
	Abha	14	12	21	47	
156.	Hitesh	10	9	15	44	1
	Anurag	15	12	18	45	
157.	Dinesh	14	12	18	44	7
	Sangeeta	10	9	18	37	
158.	Rakesh	8	9	13.5	30.5	1
	Abha	10	9	10.5	29.5	
159.	Vijay	11	13.5	13.5	38	8 5
	Prabha	10	9	10 5	29.5	
160.	Rakesh	10	12	18	40	
	Anita	13	13.5	13.5	40	

ANNEXURE-VII

Cordiality Scores, and their Squares, of the Subject Sibling under Eight Different Sub-Groups According to their Age, Sex and Birth-Order

Sub-group Sl. No.	*Much older brother*		*Much older sister*			*Much younger brother*			*Much younger sister*		
	Cordiality score S_x	S^2_x	*Sl. No.*	*Cordiality score* S_x	S^2_x	*Sl. No.*	*Cordiality score* S_x	S^2_x	*Sl. No.*	*Cordiality score* S_x	S^2_x
1	45	2025	41	37	1369	81	45	2025	121	44	1936
2	38	1444	42	31	961	82	39	1521	122	35	1225
3	43	1849	43	36	1296	83	39	1521	123	48	2304
4	45	2025	44	38	1444	84	39	1521	124	41	1681
5	46	2116	45	45	2025	85	49	2401	125	49	2401
6	38	1444	46	36	1296	86	50	2500	126	26	676

(Contd.)

7	27	729	47	45	2025	87	37	1369	127	25	625
8	39	1521	48	47	2209	88	51	2601	128	52	2704
9	26	676	49	42	1764	89	49	2401	129	39	1444
10	30	900	50	43	1849	90	53	2809	130	39	1521
11	30	900	51	39	1521	91	46	2116	131	40	1600
12	36	1296	52	44	1936	92	43	1849	132	49	2401
13	40	1600	53	45	2025	93	50	2500	133	46	2116
14	51	2601	54	40	1600	94	42	1764	134	42	1764
15	41	1681	55	46	2116	95	51	2601	135	44	1936
16	31	961	56	39	1521	96	46	2116	136	45	2025
17	44	1936	57	46	2116	97	47	2209	137	46	2116
18	39	1521	58	46	2116	98	47	2209	138	52	2704
19	48	2304	59	36	1296	99	50	2500	139	42	1764
20	42	1764	60	36	1296	100	41	1681	140	29	841
21	32	1024	61	44	1936	101	51	2601	141	42	1764

22	47	2209	62	50	2500	102	47	2209	142	53	2809
23	45	2025	63	46	2116	103	42	1764	143	53	2809
24	40	1600	64	45	2025	104	44	1936	144	47	2209
25	49	2401	65	45	2025	105	37	1369	145	42	1764
26	51	2601	66	46	2116	106	40	1600	146	50	2500
27	33	1089	67	54	2916	107	51	2601	147	37	1369
28	37	1369	68	34	1156	108	36	1296	148	44	1936
29	37	1369	69	39	1521	109	41	1681	149	33	1089
30	47	2209	70	43	1849	110	37	1369	150	44	1936
31	42	1764	71	49	2401	111	41	1681	151	44	1936
32	33	1089	72	23	529	112	36	1296	152	30	900
33	33	1089	73	49	2401	113	35	1225	153	39	1521
34	46	2116	74	59	3500	114	44	1936	154	52	2704
35	34	1156	75	36	1296	115	46	2116	155	47	2209

(Contd.)

36	44	1936	76	49	2401	116	35	1225	156	45		2025
37	44	1936	77	39	1521	117	51	2601	157	37		1369
39	31	961	78	36	1296	118	37	1369	158	30		900
38	38	1444	79	42	1764	119	31	961	159	30		900
40	40	1600	80	35	1225	120	51	2601	160	40		1600
	Σ1592	65380		1671	71275		1747	77651		1671		72033

ANNEXURE VII—(*Contd.*)

Continue from Prepage

Sub-gtoup Sl. No.	Just older brother		Just older sister			Just younger brother			Just younger sister		
	Cordiality score S_x	S_x^2	Sl. N.	Cordiality score S_x	S_x^2	Sl. No.	Cordiality score S_x	S_x^2	Sl. No.	Cordiality score S_x	S_x^2
161	41	1681	201	22	484	241	46	2116	281	24	576
162	44	1936	202	46	2116	242	52	2704	282	42	1764
163	50	2500	203	39	1521	243	42	1764	283	50	2500
164	25	625	204	42	1764	244	52	2704	284	38	1444
165	44	1936	205	38	1444	245	34	1156	285	23	529
166	42	1764	206	37	1369	246	41	1681	286	40	1600
167	31	961	207	39	1521	247	51	2601	287	50	2500
168	41	1681	208	32	1024	248	55	1225	288	54	2916
169	36	1296	209	51	2601	249	38	1444	289	17	289
170	17	289	210	42	1764	250	40	1600	290	37	1369
171	46	2116	211	38	1444	251	37	1369	291	39	1521

(Contd.)

172	48	2304	212	38	1444	253	36	1296	292	26	676
173	36	1296	213	38	1444	253	42	1764	293	36	1296
174	33	1089	214	44	1936	254	49	2401	294	33	1098
175	33	1089	215	38	1444	255	30	900	295	42	1764
176	34	1156	216	37	1369	256	43	1849	296	36	1296
177	47	2209	217	42	1764	257	50	2500	297	41	1681
178	49	2401	218	47	2209	258	35	1225	298	34	1156
179	46	2116	219	55	3025	259	45	2025	299	47	2209
180	49	2401	220	43	1849	260	33	1089	300	46	2116
181	42	1764	221	31	961	261	40	1600	301	41	1681
182	41	1681	222	40	1600	262	34	1156	302	38	1444
183	41	1681	223	52	2704	263	48	2304	303	52	2704
184	53	2809	224	43	1849	264	46	2116	304	41	1681
185	48	2304	225	33	1089	265	33	1089	305	51	2601
186	36	1296	226	36	1296	266	32	1024	306	50	2500
187	36	1296	227	43	1849	267	44	1936	307	44	1936
188	37	1369	228	53	2809	268	48	2304	308	44	1936
189	30	900	229	43	1849	269	43	1849	309	36	1296
190	41	1681	230	35	1225	270	52	2704	310	42	1764

191	33	1089	231	43	1849	271	36	1296	311	44	1936
192	31	961	232	34	1156	272	33	1089	312	49	2401
193	48	2304	233	42	1764	273	35	1225	313	50	2500
194	44	1936	234	40	1600	274	41	1681	314	48	2304
195	40	1600	235	45	2025	275	34	1156	315	31	961
196	43	1849	236	47	2209	276	42	1764	316	49	2401
197	37	1369	237	50	2500	277	39	1521	317	31	961
198	51	2601	238	47	2209	278	44	1936	318	43	1849
199	29	841	239	39	1521	279	52	2704	319	37	1369
200	35	1225	240	39	1521	280	50	2500	320	42	1764
	Σ1588	65402		1643	70121		1667	71497		1618	68280

ANNEXURE-VIII

Calculation of Means and Standard Deviation of Cordiality Scores of Siblings Under Different Sub-Samples of the Sample Population

Gropup 1:

Much older Brother		*Much younger Brother*	
Score S_x	S^2_x	*Score* S_y	S^2_y
5	2025	45	2025
38	1444	39	1521
43	1849	39	1521
45	2025	39	1521
46	2116	49	2401
38	1444	50	2500
27	729	37	1369
39	1524	51	2601
26	676	49	2401
30	900	53	2809
30	900	46	2116
36	1296	43	1849
40	1600	50	2500
51	2601	42	1764
41	1681	51	2604
31	961	46	2116
44	1936	47	2209
39	1521	47	2209
48	2304	50	2500
42	1764	41	1618

$\Sigma S_x = 789$, $\Sigma S_x^2 = 32293$ $\Sigma S_y = 914$, $\Sigma S_y^2 = 42314$ $N = 20$

$$M=\frac{\Sigma S_x}{N}=\frac{189}{20}=39.45$$

$$\sigma=\frac{1}{N}\sqrt{N\,\Sigma S_x^2-(\Sigma S_x)^2}$$

$$=\frac{1}{20}\sqrt{20\times 32293-(789)^2}$$

$$=\frac{1}{20}\sqrt{23339}=\frac{152.77}{20}$$

$$\sigma=7.63$$

$$M=\frac{914}{20}=45.7$$

$$\sigma=\frac{1}{N}\sqrt{N\Sigma S_y^2-(\Sigma S_y)^2}$$

$$=\frac{1}{20}\sqrt{20\times 42314-(984)^2}$$

$$=\frac{1}{20}\sqrt{10884}=\frac{1}{20}\times 104.326$$

$$\sigma=5.21$$

Group 2:

Just older Brother		*Just younger Brother*	
Score S_x	S^2_x	*Score* S_y	S^2_y
41	1681	33	1089
44	1936	46	2116
50	2500	52	2704
25	625	42	1764
44	1936	52	2704
42	1764	34	1156
31	961	41	1681
41	1681	51	3721

(*Contd.*)

36	1296	35	1225
17	289	38	1444
46	2116	40	1600
48	2304	37	1369
36	1296	36	1296
33	1089	42	1764
33	1089	49	2401
34	1156	30	900
47	2209	43	1849
49	2401	50	2500
46	2116	35	1225
49	2401	45	2025

$\Sigma S_x = 792$, $\Sigma S_x^2 = 32846$ $\Sigma S_y = 841$, $\Sigma S_y^2 = 36533$ $N = 20$

$$M = \frac{792}{20} = 39.6$$

$$\sigma = \frac{1}{N}\sqrt{N\Sigma S_x^2 - (\Sigma S_x)^2}$$

$$= \frac{1}{20}\sqrt{20 \times 32846 - (792)}$$

$$= \frac{1}{20}\sqrt{29656} = \frac{1}{20} \times 172.20$$

$$\sigma = 8.61$$

$$M = \frac{841}{20} = 42.05$$

$$\sigma = \frac{1}{N}\sqrt{N\Sigma S_y^2 - (\Sigma S_y)^2}$$

$$= \frac{1}{20}\sqrt{20 \times 36533 - (841)^2}$$

$$= \frac{1}{20}\sqrt{23379} = \frac{152.90}{20}$$

$$\sigma = 7.64$$

Group 3

Much older sister		*Much younger sister*	
Score S_x	S_x	*Score* S_y	S_y^2
37	1369	44	1936
31	961	35	1225
36	1296	48	2304
38	1444	41	1681
45	2025	49	2401
36	1296	26	676
45	2025	25	625
47	2209	52	2704
42	1764	38	1444
43	1849	39	1521
39	1521	40	1600
44	1936	49	2401
45	2025	46	2116
40	1600	42	1764
46	2116	44	1936
39	1521	45	2025
46	2116	46	2116
46	2116	52	2704
36	1296	42	1764
36	1296	29	841

$\Sigma S_x = 817$, $\Sigma S_x^2 = 33781$ $\Sigma S_y = 832$ $\Sigma S_y^2 = 35784$ $N = 20$

$$M = \frac{817}{20} = 40.85$$

$$\sigma = \frac{1}{N}\sqrt{N\Sigma S_x^2 - (\Sigma S_x)^2}$$

$$= \frac{1}{20}\sqrt{20 \times 33781 - 667489}$$

$$= \frac{1}{20}\sqrt{8136} = \frac{1}{20} \times 90.17$$

$$\sigma = 4.50$$

$$M = \frac{832}{20} = 41.6$$

$$\sigma = \frac{1}{N}\sqrt{N\Sigma S_y^2 - (\Sigma S_y)^2}$$

$$= \frac{1}{20}\sqrt{20 \times 33784 - 692224}$$

$$= \frac{1}{20}\sqrt{23456} = \frac{1}{20} \times 153.13$$

$$\sigma = 7.66$$

Group 4

Just older sister Score S_x	S_x^2	*Just younger sister* Score S_y	S_y^2
		24	576
31	961	42	1764
40	1600	50	2500
52	2704	38	1444
43	1849	23	529
33	1089	40	1600
36	1296	50	2500
43	1849		

(Contd.)

53	2809	54	2916
43	1849	17	289
35	1225	37	1369
43	1849	39	1521
34	1156	26	676
42	1764	36	1296
40	1600	33	1089
45	2025	42	1764
47	2209	36	1296
50	2500	41	1681
47	2209	34	1156
39	1521	47	2209
39	1521	46	2116

$\Sigma S_x = 835$, $\Sigma S_x^2 = 35585$ $\Sigma S_y = 755$, $\Sigma S_y^2 = 30291$ $N = 20$

$$M = \frac{835}{20} = 41.75$$

$$\sigma = \frac{1}{N}\sqrt{N\Sigma S_x^2 - (\Sigma S_x)^2}$$

$$= \frac{1}{20}\sqrt{20 \times 35585 - 697225}$$

$$= \frac{1}{20}\sqrt{14475} = \frac{120.31}{20}$$

$$\sigma = 6.01$$

$$M = \frac{755}{20} = 37.75$$

$$\sigma = \frac{1}{N}\sqrt{N\Sigma S_y^2 - (\Sigma S_y)^2}$$

$$= \frac{1}{20}\sqrt{20 \times 30291 - (755)^2}$$

$$= \frac{1}{20}\sqrt{35795} = \frac{1}{20} \times 189.19$$

$$\sigma = 9.45$$

Group 5

Just older Sister		*Just younger Brother*	
Score S_x	S_x^2	*Score* S_y	S_y^2
22	484	40	1600
46	2116	34	1156
39	1521	48	2304
42	1764	46	2116
38	1444	33	1089
37	1369	32	1024
39	1521	44	1936
32	1024	48	2304
51	2601	43	1849
42	1764	52	2704
38	1444	36	1296
38	1444	33	1089
38	1444	35	1225
44	1936	41	1681
30	1444	34	1156
37	1369	42	1764
42	1764	39	1521
47	2209	44	1936
55	3025	52	2704
43	1849	50	2500

$\Sigma S_x = 808$, $\Sigma S_x^2 = 33536$ $\Sigma S_y = 826$, $\Sigma S_y^2 = 34964$ $N = 20$

$$M = \frac{808}{20} = 40.4$$

$$\sigma = \frac{1}{N}\sqrt{N\Sigma S_x^2 - (\Sigma S_x)^2}$$

$$= \frac{1}{20}\sqrt{20 \times 33536 - 652864}$$

$$= \frac{1}{20}\sqrt{17856} = \frac{1}{20} \times 133.62$$

$$\sigma = 6.68$$

$$M = \frac{826}{20} = 41.3$$

$$\sigma = \frac{1}{N}\sqrt{N\Sigma S_y^2 - (\Sigma S_y)^2}$$

$$= \frac{1}{20}\sqrt{20 \times 34964 - (\Sigma S_y)^2}$$

$$= \frac{1}{20}\sqrt{17004} = \frac{1}{20} \times 130\ 39$$

$$\sigma = 6.51$$

Group 6

Much older Sister		*Much younger Brother*	
Score S_x	S_x^2	*Score* S_y	S_y^2
44	1936	51	2601
50	2500	47	2209
46	2116	42	1764
45	2025	44	1936
45	2116	37	1369
46	2116	40	1600
54	2916	51	2601

(Contd.)

34	1156	36	1296
39	1521	41	1681
43	1849	37	1369
49	2401	41	1681
23	529	36	1396
49	2401	35	1225
50	2500	44	1936
36	1296	46	2116
49	2401	35	1225
39	1521	51	2601
36	1296	37	1369
42	1764	31	961
35	1225	51	2601

$\Sigma S_x = 854$, $\Sigma S_x^2 = 37494$ $\Sigma S_y = 833$, $\Sigma S_y^2 = 35437$ $N = 20$

$$M = \frac{854}{20} = 42.7$$

$$\sigma = \frac{1}{N}\sqrt{N\Sigma S_x^2 - (\Sigma S_x)^2}$$

$$= \frac{1}{20}\sqrt{20 \times 37494 - (854)^2}$$

$$= \frac{1}{20}\sqrt{20560} = \frac{1}{20} = 143.40$$

$$\sigma = 7.17$$

$$M = \frac{833}{20} = 41.65$$

$$\sigma = \frac{1}{N}\sqrt{\Sigma S_y^2 - (\Sigma S_y^2 - (\Sigma S_y)^2}$$

$$= \frac{1}{N}\sqrt{20 \times 35437 - (833)^2}$$

$$= \frac{1}{20}\sqrt{14851} = \frac{1}{2} \times 121.86$$

$$\sigma = 6.093$$

Group 7

Juet older Brother		*Just younger sister*	
Score S_x	S^2_x	*Score* S_y	S^2_y
42	1764	41	1681
41	1681	38	1444
41	1681	52	2704
53	2809	41	1681
48	2304	51	2601
36	1296	50	2500
36	1296	44	1936
37	1369	44	1936
30	900	36	1296
41	1681	42	1764
33	1089	44	1936
31	961	49	2401
48	2304	50	2500
44	1936	48	2304
40	1600	31	961
43	1849	49	2401
37	1369	31	961
51	2601	43	1849
29	841	37	1369
35	1225	42	1764

$\Sigma S_x = 796$, $\Sigma S_x^2 = 32536$ $\Sigma S_y = 863$, $\Sigma S_y^2 = 37989$ $N = 20$

(Contd.)

$$M=\frac{796}{20}=39.8$$

$$\sigma=\frac{1}{N}\sqrt{N\Sigma S_x^2-(\Sigma S)_x^2}$$

$$=\frac{1}{20}\sqrt{20\times 32536-633616}$$

$$=\frac{1}{20}\sqrt{17104}=\frac{1}{20}\times 130.77$$

$$\sigma=6.53$$

$$M=\frac{863}{20}=43.15$$

$$\sigma=\frac{1}{N}\sqrt{N\Sigma S_y^2-(\Sigma S_y)^2}$$

$$=\frac{1}{20}\sqrt{20\times 37989-744769}$$

$$=\frac{1}{20}\sqrt{15011}=\frac{1}{20}\times 122.51$$

$$\sigma=6.12$$

Group 8

Much Older Brother		*Much Younger Sister*	
Score S_x	S_x^2	*Score* S_y	S_y^2
32	1024	42	1764
47	2209	53	2809
45	2025	53	2809
40	1600	47	2209
49	2401	42	1764
51	2601	50	2500
33	1089	37	1369
37	1369	44	1936
37	1369	33	1089

(Contd.)

47	2209	44	1936
42	1764	44	1936
33	1089	30	900
33	1089	39	1521
46	2116	52	2704
34	1156	47	2209
44	1936	45	2025
44	1936	37	1369
31	961	30	900
38	1444	30	900
40	1600	40	1600

ΣS_x, 803 ΣS_x^2=32987 ΣS_y=839, ΣS_y^2=36249 N20

$$M=\frac{803}{20}=40.15$$

$$\sigma=\frac{1}{N}\sqrt{N\Sigma S_x^2-(\Sigma S_x)^2}$$

$$=\frac{1}{20}\sqrt{20\times 32987-644809}$$

$$=\frac{1}{20}\sqrt{14931}=\frac{1}{20}\times 122.19$$

$$\sigma=6.10$$

$$M=\frac{839}{20}=41.95$$

$$\sigma=\frac{1}{N}\sqrt{N\Sigma S_y^2-(\Sigma S_y)^2}$$

$$=\frac{1}{20}\sqrt{20\times 362.9-(839)^2}$$

$$=\frac{1}{20}\sqrt{1059}=\frac{1}{20}\times 145.12$$

$$\sigma=7.25$$

ANNEXURE—IX

Reciprocity Scores, and Their Squares, of ten Sibling Pairs of the Total Sample Selected from each of the Eight Sub-Groups According to their age, Sex and Birth-Order

Sub-group	*Same-sex* (B_1)								*Different sex* (B_2)							
	Large age difference (A_1)				*Small age difference* (A_2)				*Large age difference* (A_1)				*Small age difference* (A_2)			
	Older Brother-Younger Brother (C_1)		*Older Sister-Younger Sister* (C_2)		*Older Brother-Younger Brother* (C_1)		*Older sister-Younger Sister* (C_2)		*Older Brother-Younger Sister* (C_1)		*Older Sister-Younger Brother* (C_2)		*Older Brother-Younger Sister* (C_1)		*Older Sister-Younger Brother* (C_2)	
Reciprocity Score	R	R^2	R	R^2	R	R^2	R	R^2	R	R^2	R	R^2	R	R^2	R	R^2
1	0	0	7	49	8	64	7	49	10	100	7	49	2.5	6.25	17.5	306.25
2	1	1	4	16	3.5	12.25	3.5	12.25	6	36	3	9	3	9	12	144

(Contd.)

3	4.5	20.25	11.5	132.25	1.5	2.25	1.5	2.25	8	64	4.5	20.25	12.5	156.25	9.5	90.25
4	6.5	42.25	3	9	17	289	4.5	20.25	7	49	0.5	0.25	3.5	12.25	4.5	20.25
5	3	9	5.5	30.25	10	100	10	100	7	49	8	64	4.5	20.25	4.5	20.25
6	12.5	156.25	11.5	132.25	7.5	56.25	3.5	12.25	0.5	0.25	6	36	14	196	5	25
7	10.5	132.25	20.5	420.25	9.5	90.25	7	49	5.5	30.25	3.5	12.25	8	64	5	25
8	12	144	5	25	0.5	0.25	1.5	2.25	6.5	42.25	2	4	7	49	17.5	306.25
9	22.5	506.25	4.5	20.25	0	0	26	676	4	16	0.5	0.25	5.5	30.25	7.5	56.25
10	23	529	5	25	22	484	1.5	2.25	3	9	6	36	1	1	8.5	70.25
Σ	96.5	1540.25	77.5	859.25	79.5	1098.25	66	925.5	57.5	395.75	41	231	61.5	544.25	91.5	1065.75

ANNEXURE X

Scores of Cordiality and Other Variables for the Subject Siblings

Sl. No.	S_x	X_1	X_2	X_3	X_4	S_xX_1	S_xX_2	S_xX_3	S_xX_4	S_x^2	X_1^2	X_2^2	X_3^2	X_4^2
1	55	5	14	11	53	275	770	505	2915	3025	25	196	121	2809
2	45	5	15	11	44	225	675	495	1980	2025	25	225	121	1936
3	38	4	18	6	40	152	684	228	1520	1444	16	324	36	1600
4	39	4	22	6	50	156	858	234	1950	1521	16	484	36	2500
5	44	5	22	7	50	220	968	308	2200	1936	25	484	49	2500
6	39	5	16	7	42	195	624	273	1638	1521	25	256	49	1764

(Contd.)

7	45	3	31	3	45	135	1395	135	2025	2025	9	961	9	2025
8	39	3	12	3	42	117	468	117	1638	1521	9	144	9	1764
9	46	3	14	3	50	138	644	138	2300	2116	9	196	9	2500
10	49	3	18	3	54	147	882	147	2646	2401	9	324	9	2916
11	38	4	31	8	50	152	1178	304	1900	1444	16	961	64	2500
12	51	4	23	8	50	204	1173	408	2550	2601	16	529	64	2500
13	27	5	21	11	50	135	567	297	1350	729	25	441	121	2500
14	37	5	26	11	50	185	962	407	1850	1369	25	676	121	2500
15	39	8	29	8	72	312	1131	312	2808	1521	64	841	64	5184
16	51	8	27	8	69	408	1377	408	3519	2601	64	729	64	4761
17	26	4	34	8	70	104	884	208	1820	676	16	1156	64	4900
18	49	4	29	8	68	196	1421	392	3332	2401	16	841	64	4624
19	30	6	18	6	45	180	540	180	1350	900	36	324	36	2025
20	53	6	18	6	58	318	954	318	3074	2809	36	324	36	3364
21	30	6	25	13	60	180	750	390	1800	900	36	625	169	3600
22	46	6	18	13	60	276	828	598	2760	2116	36	324	169	3600
23	36	7	29	10	65	252	1044	360	2340	1296	49	841	100	4225
24	43	7	29	10	59	301	1247	430	2537	1849	49	841	100	3481

25	40	5	22	11	58	200	924	440	2320	1600	25	484	121	3364
26	50	5	14	11	64	250	700	550	3200	2500	25	196	121	4096
27	51	4	22	12	42	204	1122	601	2142	2601	16	484	144	1764
28	42	4	24	12	52	168	1008	504	2184	1764	16	576	144	2704
29	41	5	35	13	70	205	1935	533	2870	1681	25	1225	169	4900
30	51	5	31	13	65	255	1581	663	3315	2601	25	961	169	4225
31	31	8	26	8	62	248	806	248	1922	961	64	676	64	3844
32	46	8	34	8	80	368	1564	358	3680	2116	64	1156	64	640
33	44	8	40	16	63	352	1760	704	2772	1936	64	1600	256	3989
34	47	8	42	16	68	376	1974	752	3196	2209	64	1764	256	4624
35	39	8	32	14	70	312	1248	546	2730	1521	64	1024	196	4900
36	47	8	34	14	75	376	1598	658	3525	2209	64	1156	196	5625
37	48	6	28	7	70	368	1344	336	3960	2304	36	784	49	4900
38	50	6	26	7	70	300	1300	350	3500	2500	36	676	49	4900
39	42	8	35	8	75	336	1470	336	3150	1764	64	1225	64	5625
40	41	8	37	8	72	328	1517	328	2952	1681	64	1369	64	5184

(Contd.)

41	41	2	12	6	50	82	492	246	2050	1681	4	144	36	2500
42	33	2	12	6	50	66	396	198	1650	1089	4	144	36	2500
43	44	4	22	14	50	176	968	616	2200	1936	16	484	196	2500
44	46	4	22	14	61	184	1012	644	2806	2116	16	484	196	4900
45	50	7	43	7	70	350	2150	350	3500	2500	49	1849	49	4900
46	52	7	43	7	77	364	2236	364	4004	2704	49	1849	49	5929
47	25	4	19	8	50	180	475	200	1250	625	16	361	64	2500
48	42	4	19	8	62	168	798	308	2604	1764	16	361	64	3844
49	44	4	20	7	50	176	880	364	2200	1936	16	400	49	2500
50	52	4	20	7	52	208	1040	364	2704	2704	16	400	49	2704
51	42	3	10	4	40	126	420	168	1680	1764	9	100	16	1600
52	34	3	10	4	42	102	340	136	1428	1156	9	100	16	1764
53	31	3	30	10	45	93	930	310	1395	961	9	900	100	2025
54	41	3	16	10	45	123	656	410	1845	1681	9	256	100	2025
55	41	2	22	5	55	82	902	205	2255	1681	4	484	25	3025
56	51	2	22	5	60	102	1122	255	3060	2601	4	484	25	3600
57	36	3	22	4	45	108	792	144	1620	1296	9	484	16	2025

58	36	3	24	4	50	108	864	134	1800	1296	9	576	16	2500
59	17	3	20	3	50	51	340	51	850	289	9	400	9	2500
60	39	3	18	3	50	117	702	117	1950	1521	9	324	9	2500
61	46	3	9	5	60	138	414	230	2760	2116	9	81	225	3600
62	40	3	9	5	60	120	360	200	2400	1600	9	81	25	3600
63	48	5	37	6	65	240	1776	288	3120	2304	25	1369	36	4225
64	37	5	34	6	62	185	1258	222	2294	1369	25	1156	36	3844
65	36	4	29	5	50	144	1044	180	1800	1296	16	841	25	2500
66	36	4	29	5	50	144	1044	180	1800	1296	16	841	25	2500
67	33	4	19	5	45	130	627	165	1485	1098	16	361	25	2025
68	42	4	19	5	45	168	798	210	1890	1764	16	361	25	2025
69	33	4	10	16	50	132	330	528	1650	1089	16	100	256	2500
70	49	4	20	16	65	196	980	784	3185	2401	16	400	256	4225
71	34	2	13	6	36	68	510	204	1224	1156	4	225	36	1296
72	30	2	17	6	60	60	510	180	1800	900	4	239	36	3600
73	47	5	22	7	60	235	1034	329	2820	2209	25	484	49	3600

(Contd.)

74	42	5	32	7	70	210	1344	294	2940	1764	25	1024	49	4900
75	49	5	38	9	70	245	1862	441	3430	2401	25	1444	81	4900
76	50	5	40	9	70	250	2000	450	3500	2500	25	1600	81	4900
77	46	8	26	7	60	368	1196	322	2760	2116	64	676	49	3600
78	35	8	26	7	55	280	910	245	1925	1225	64	676	49	3025
79	49	4	29	5	60	196	1421	245	2940	2401	16	841	25	3600
80	45	4	40	5	70	180	1800	225	3150	2025	16	1600	25	4900
81	37	8	16	9	55	296	592	333	2035	1369	64	256	81	3025
82	40	8	15	9	50	352	660	396	2200	1936	64	225	81	2500
83	31	4	29	13	50	124	899	403	1550	961	16	841	169	2500
84	35	4	30	13	50	140	1050	455	1750	1225	16	900	169	2500
85	36	5	20	19	50	180	720	684	1800	1296	25	400	361	2500
86	48	5	24	19	70	240	1150	912	3360	2304	25	576	361	4900
87	38	5	26	12	40	190	988	456	1520	1444	25	676	144	1600
88	41	5	26	12	40	205	1066	492	1640	1681	25	676	144	1600
89	45	7	21	13	60	315	945	585	2700	2025	49	441	169	3600
90	49	7	30	13	60	343	1470	637	2940	2401	49	900	169	3600
91	36	3	16	7	40	108	579	252	1440	1296	9	256	49	1600

92	26	3	16	7	50	78	419	182	1300	676	9	256	49	2500
93	45	6	46	10	86	270	2070	450	3870	2025	36	2116	100	7396
94	25	6	40	10	60	150	1000	250	1500	625	36	1600	100	3600
95	47	3	34	8	75	141	1598	376	3525	2209	9	1156	64	5625
96	52	3	39	8	80	156	2028	416	4160	2704	9	1521	64	6400
97	42	3	28	12	45	126	1176	504	1890	1764	9	784	144	2025
98	38	3	20	12	40	114	760	456	1520	1444	9	400	144	1600
99	43	7	19	8	50	301	817	344	2150	1849	49	361	64	2500
100	39	7	19	8	55	273	741	312	2145	1521	49	361	64	3025
101	38	4	10	7	40	152	380	266	1520	1444	16	100	49	1600
102	40	4	19	7	40	160	400	280	1600	1600	16	100	49	1600
103	44	8	20	11	85	352	880	484	3740	1936	64	400	121	7225
104	49	8	20	11	85	392	980	539	4165	2401	64	400	121	7225
105	46	5	18	14	50	230	828	644	2300	2116	25	324	196	2500
106	46	5	20	14	63	230	920	644	2898	2116	25	400	196	3969
107	40	5	25	11	60	200	1000	440	2400	1600	25	626	121	3600

(Contd.)

108	42	5	25	11	65	210	1050	462	2730	1764	25	625	121	4225
109	46	3	19	13	60	138	874	598	2760	2116	9	361	169	3600
110	44	3	29	13	73	132	1276	572	3212	1936	9	841	169	5329
111	39	3	27	8	75	117	1053	312	2925	1521	9	729	64	5625
112	45	3	27	8	72	135	1215	360	3230	2025	9	729	64	5184
113	46	7	35	12	70	322	1610	552	3220	2116	49	1225	144	4900
114	46	7	30	12	65	322	1380	552	2990	2116	49	900	144	4225
115	46	7	34	10	65	322	1564	460	2990	2116	49	1165	100	4225
116	52	7	36	10	68	364	1872	520	3536	2704	49	1296	100	4624
117	36	3	25	9	50	108	900	324	1800	1296	9	625	81	2500
118	42	3	20	9	55	126	840	378	2310	1764	9	400	81	3025
119	36	2	16	7	40	72	576	252	1440	1296	4	256	49	1600
120	29	2	19	7	42	58	551	203	1218	841	4	361	49	1764
121	31	2	16	7	60	62	496	217	1860	961	4	256	49	3600
122	24	2	24	7	60	48	576	168	2040	576	4	576	49	3600
123	40	5	23	14	65	200	928	500	2600	1600	25	529	196	4225
124	42	5	24	14	68	210	1008	588	2856	1764	25	576	196	1624
125	52	3	24	11	60	156	1248	572	3120	2704	9	576	121	3600

126	50	3	20	11	60	150	1000	550	3000	2500	9	400	121	3600
127	43	6	35	10	50	258	1505	430	2150	1849	36	1225	100	2500
128	38	6	31	10	50	228	1178	380	1900	1444	36	961	100	2500
129	33	3	34	12	70	99	1122	396	2310	1089	9	1136	144	4900
130	23	3	26	12	50	63	598	276	1150	529	9	676	144	2500
131	36	7	19	10	50	252	684	360	1800	1296	49	361	100	2500
132	40	7	17	10	65	280	680	400	2600	1600	49	289	100	4225
133	43	5	9	14	45	215	387	602	1935	1849	25	81	196	2025
134	50	5	15	14	50	250	750	700	2500	2500	25	225	196	2500
135	53	5	26	13	55	265	1378	689	2915	2809	25	676	169	3025
136	54	5	30	13	60	270	1620	702	3240	2916	25	900	169	3600
137	43	2	25	9	72	86	1075	387	3096	1849	3	625	81	5184
138	17	2	26	9	65	34	442	153	1105	289	4	676	81	4225
139	35	2	32	6	70	70	1120	210	2450	1225	4	1024	36	5900
140	37	2	34	6	75	74	1258	222	2775	1369	4	1150	36	5625
141	43	5	27	11	70	215	1161	473	3010	1849	25	729	121	4900
142	39	5	22	11	70	195	858	429	2730	1521	25	484	121	4900

(Contd.)

143	34	3	25	6	50	102	850	204	1700	1156	9	625	27	2500
144	26	3	24	6	50	78	624	156	1300	676	9	576	36	2500
145	43	2	22	11	60	84	924	462	2520	1764	4	884	121	3600
146	36	2	22	11	60	72	792	396	2160	1296	4	484	121	3600
147	40	7	15	13	55	280	660	520	2200	1600	49	225	169	3025
148	33	7	19	13	60	231	627	429	1980	1089	49	361	169	3600
149	45	6	24	8	60	270	1080	360	2700	2025	36	576	64	3600
150	42	6	24	8	55	252	1008	336	2310	1764	36	576	64	3025
151	47	4	22	12	55	188	1034	564	2585	2209	16	484	144	3025
152	36	4	22	12	50	144	792	432	1800	1296	16	484	144	2500
153	50	5	23	10	70	250	1150	500	3500	2500	25	529	100	4900
154	41	5	22	10	75	205	902	410	2255	1681	25	484	100	3025
155	47	2	25	8	50	94	1175	376	2350	2209	4	625	64	2500
156	34	2	20	8	42	68	680	262	1428	1156	4	400	64	1664
157	39	7	27	11	60	273	1053	429	2340	1521	49	729	121	3600
158	47	7	30	11	75	329	1410	517	3825	2209	49	900	121	5628
159	39	4	31	10	65	156	1209	390	2535	1521	16	961	100	5225
160	46	4	38	10	80	184	1748	460	3680	2116	16	1444	100	6400

161	22	3	22	7	45	66	484	154	990	484	9	484	99	2025
162	40	3	24	7	50	120	960	280	2000	1600	9	576	49	2500
163	46	3	15	15	40	120	960	280	2000	1600	9	576	49	2500
164	34	3	21	15	45	102	714	510	1530	1156	9	441	225	2015
165	39	5	30	12	70	195	1170	468	2730	1521	25	900	144	4900
166	39	5	17	12	65	240	816	576	3120	2304	25	289	144	4225
167	42	5	26	6	62	210	1092	252	2604	1764	25	676	36	3844
168	46	5	32	6	72	230	1472	276	3312	2116	25	1024	36	5184
169	38	7	20	11	40	266	760	418	1520	1444	49	400	121	1600
170	33	7	18	11	36	231	594	363	1188	1089	49	324	121	1296
171	37	3	6	8	30	111	222	296	1110	1369	9	36	64	900
172	32	3	6	8	40	96	192	256	1280	1024	9	36	64	1600
173	39	3	30	7	80	117	1170	273	3120	1521	9	900	49	6400
174	44	3	35	7	70	132	1540	368	3088	1936	9	1225	49	4900
175	32	2	20	12	60	64	640	384	1920	1024	4	400	144	3600
176	48	2	20	12	60	56	960	576	2880	2304	4	400	144	3600

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177	52	5	20	6	70	255	1020	306	3570	2601	25	400	36	4900
178	43	5	26	6	70	215	1118	258	3010	1849	25	676	36	4900
179	42	5	18	11	50	110	756	462	2120	1764	95	324	121	2500
180	51	5	30	11	70	255	1530	561	3570	2601	25	900	121	4900
181	36	5	28	13	52	190	1064	449	1976	1444	25	724	169	2704
182	36	5	25	13	50	180	918	468	1800	1296	25	625	169	2500
183	38	3	30	7	65	114	1140	266	2470	1444	9	900	49	4225
184	33	3	36	7	72	99	1188	231	2376	1089	9	1296	49	5184
185	38	3	32	9	65	114	1216	342	2479	1444	9	1024	81	4225
186	34	3	32	9	70	112	1088	306	2380	1156	9	1024	41	4900
187	44	3	35	10	65	132	1540	440	2860	1936	9	1225	100	4225
188	41	3	35	10	68	123	1435	410	2788	1681	9	169	121	2025
189	38	3	13	11	45	114	494	418	1710	1444	9	1225	121	2025
190	33	3	15	11	50	99	495	363	1650	1089	9	225	121	2500
191	37	5	10	11	55	185	370	407	2035	1369	25	100	121	3026
192	42	5	6	11	45	210	252	462	1890	1764	25	36	121	2025
193	41	5	29	7	65	195	1189	287	2665	1681	25	841	49	4225
194	39	5	29	7	70	195	1131	273	2730	1521	25	841	49	4900

195	47	4	36	8	52	188	1692	376	2444	2209	26	1296	64	2704
196	44	4	31	8	55	176	1364	352	2420	1936	16	961	64	3025
197	55	6	23	8	65	330	1265	440	3575	3025	36	529	64	4225
198	52	6	18	8	60	312	936	936	3120	2704	36	324	64	3600
199	43	5	31	10	65	215	133	430	2795	1849	25	961	100	4225
200	49	5	25	10	65	245	1225	440	3185	2401	25	675	100	4225
261	49	5	20	6	58	220	880	264	2552	1936	25	400	36	3364
202	51	5	24	6	60	255	1224	306	3060	2601	25	576	36	3600
203	50	3	31	7	65	150	1550	350	3250	2500	9	961	49	4225
204	47	3	26	7	60	141	1222	329	2820	2209	9	676	49	3600
205	46	3	19	6	55	138	874	276	2530	2116	9	361	36	3025
206	42	3	14	6	45	126	588	252	1890	1764	9	196	36	2025
207	45	5	14	11	55	225	630	495	2475	2025	25	196	121	3025
208	45	5	16	11	55	225	720	270	2475	2025	25	256	121	3025
209	45	2	25	6	50	90	1125	222	2250	2025	4	625	36	2500
210	37	2	23	6	50	74	851	405	1850	1369	4	529	36	2500

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211	45	6	38	9	73	270	1710	360	3285	2025	36	1444	81	5329
212	48	6	28	9	60	240	1120	648	2400	1600	36	786	81	3600
213	54	6	35	12	74	324	1890	600	3996	2916	36	1225	144	5476
214	50	6	38	12	78	300	1900	374	3900	2500	36	1444	144	6084
215	36	6	38	11	78	204	1292	396	2652	1156	36	1444	121	6084
216	36	6	34	11	75	216	1224	273	2700	1296	36	1156	121	5625
217	39	5	32	7	72	195	1248	280	2808	1521	25	1024	49	5184
218	40	5	30	7	65	200	2100	301	2603	1600	24	900	49	4225
219	43	5	34	7	75	215	1462	259	3225	1849	25	1156	49	5625
220	34	5	27	7	52	185	999	441	1924	1369	25	729	49	2704
221	49	5	25	9	52	245	1225	421	2548	2401	25	625	81	2704
222	41	5	21	9	55	205	851	369	2255	1681	25	441	81	3025
221	23	5	25	11	45	115	575	253	1035	529	25	625	121	2025
224	36	5	27	11	50	180	972	396	1800	1296	25	729	121	2500
225	48	6	21	10	60	288	1008	480	2880	2304	36	441	100	3600
226	34	6	15	10	50	204	810	340	1700	1156	36	225	100	2500
227	49	6	32	11	70	294	1568	539	3430	2401	36	1024	121	4900
228	44	6	30	11	65	264	1320	484	2860	1936	36	900	121	4225

229	36	4	27	16	60	144	972	576	2160	1296	16	729	256	3600
230	46	4	22	16	65	184	1012	236	2990	2416	16	484	256	4225
231	49	6	35	1	70	294	1715	392	3430	2401	36	1225	64	4900
232	35	6	35	8	56	210	1225	280	1760	1225	36	1225	64	3136
233	39	5	16	17	60	195	624	663	2340	1521	25	256	289	3500
234	51	5	24	17	51	255	1224	867	2600	2601	25	576	289	2601
235	36	6	22	15	50	216	792	540	1800	1296	36	484	225	2500
236	37	6	18	15	50	222	666	555	1850	1369	36	324	225	2500
237	42	4	30	6	45	168	1260	252	1890	1764	16	900	36	2025
238	31	4	24	6	40	124	744	186	1240	961	16	576	31	1600
239	35	5	18	13	45	175	630	455	1575	1225	25	324	169	2025
240	51	5	18	13	45	255	918	663	2295	2601	25	324	169	2025
241	42	4	12	9	47	168	504	378	1974	1764	16	144	81	2209
242	41	4	12	9	65	164	492	369	2665	1681	16	144	81	4225
243	41	4	35	5	65	164	1435	205	2665	1681	16	1225	25	4225
244	38	4	35	5	82	152	1330	190	3116	1444	16	1225	25	6724

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245	41	5	29	11	84	205	1189	451	3444	1681	25	841	121	7056
246	52	5	27	11	82	260	1404	572	4264	2704	25	729	121	6724
247	53	6	22	9	45	318	1166	477	2385	2809	36	484	81	2025
248	41	6	30	9	70	246	1230	369	2810	1681	36	900	81	4900
249	48	8	38	15	80	384	1824	720	3840	2304	64	1444	225	6400
250	51	8	32	15	75	408	1632	765	3825	2601	64	1024	225	5625
251	36	6	25	11	50	216	900	399	1800	1296	36	625	121	2500
252	50	6	32	11	70	400	1600	550	3500	2500	36	1024	121	4900
253	36	3	21	7	50	108	756	252	1800	1296	9	441	49	2500
254	44	3	16	7	50	132	704	308	2200	1936	9	256	49	2500
255	37	5	16	13	50	185	592	481	1850	1369	25	256	169	2500
256	44	5	30	13	70	220	1320	572	3080	1936	25	900	169	4900
257	30	5	20	11	50	150	600	330	1500	900	25	400	121	2500
258	36	7	22	11	50	180	792	396	1800	1296	25	484	121	2500
259	41	5	27	12	60	217	1107	492	2460	1681	49	729	144	3600
260	42	7	25	12	55	294	1052	504	2310	1764	49	625	144	3025
261	32	2	20	5	40	64	640	160	1280	1024	4	400	25	1600
262	44	2	22	5	55	88	968	220	2420	1936	4	484	25	3025

263	31	7	28	13	65	217	868	403	2015	961	49	784	169	4225
264	48	7	32	13	70	336	1536	624	3360	2704	49	1024	169	4900
265	48	7	30	6	80	336	1440	288	3840	2304	49	500	36	6400
266	50	7	25	6	75	350	1250	300	3750	2500	49	625	36	5625
267	40	5	30	7	78	220	1320	308	3080	1936	25	900	49	4900
268	48	5	30	7	70	240	1440	336	3360	2304	25	900	49	4900
269	40	6	20	6	60	240	800	240	2400	1600	36	400	36	3600
270	31	6	16	6	55	186	496	186	1705	961	36	256	36	3025
271	42	6	25	12	64	252	1050	504	2688	1764	36	625	144	4096
272	49	6	30	12	70	294	1370	588	3430	2401	36	900	144	4900
273	37	6	30	10	74	222	1110	370	2738	1369	36	900	100	5476
274	31	6	24	10	60	186	744	310	1860	961	36	576	100	3600
275	51	5	22	9	70	255	1122	459	3570	2601	25	484	81	4900
276	43	5	18	9	60	215	774	387	2580	1849	25	324	81	3600
277	29	4	20	9	60	116	580	261	1740	841	16	400	81	3600
278	37	4	20	9	60	148	740	333	2220	1369	16	400	81	3600

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279	36	7	36	11	72	252	1296	396	2592	1296	49	1296	121	5184
280	42	7	38	11	75	294	1596	462	3150	1764	49	1444	121	5625
281	32	3	13	5	40	99	416	160	1281	1024	9	169	25	1600
282	42	3	15	5	45	129	630	210	1890	1764	9	225	25	2025
283	47	3	24	8	65	141	648	376	3355	2209	9	576	64	42 5
284	53	3	29	8	70	159	1537	424	3710	2809	9	841	64	4900
285	45	4	36	5	78	180	1620	225	3510	2025	16	1296	25	6084
286	53	4	32	5	72	212	1696	265	3816	2809	16	1024	25	5184
287	40	7	28	9	80	280	1120	364	3200	1600	49	784	81	6402
288	47	7	24	9	75	329	1128	423	3525	2209	46	576	81	5625
289	49	4	22	10	56	196	1078	490	2744	2401	16	484	100	3136
290	42	4	24	10	60	168	1008	420	2520	1764	16	576	100	3600
291	51	8	32	12	75	408	1632	612	3825	2601	64	1024	144	5625
292	50	8	37	12	85	400	1850	600	4280	2500	64	13 9	144	7225
293	33	6	4	10	35	198	132	330	1155	1089	36	16	100	1225
294	37	6	4	10	40	222	148	370	1480	1369	36	16	100	1600
295	37	5	16	7	45	185	592	259	1665	1369	25	256	49	2025
296	43	5	14	7	40	215	602	301	1720	1349	25	196	49	1600

297	37	6	18	18	55	222	666	663	2035	1369	36	324	324	3025
298	33	6	16	18	53	198	528	594	1749	1089	36	256	324	2809
299	47	5	36	12	80	235	1692	564	3760	2209	25	1296	144	6400
300	44	5	36	12	78	220	1584	528	3432	1936	25	1296	144	6084
301	42	7	30	13	65	294	1260	546	2730	1764	49	900	169	4225
302	44	7	28	13	60	308	1232	572	2649	1936	49	784	169	3600
303	33	4	36	21	45	132	1188	693	1485	1089	16	1296	441	2025
304	29	4	36	21	466	11	1044	609	1334	841	16	1296	661	2116
305	32	3	18	7	56	96	576	224	1792	1024	9	324	49	3136
306	37	3	14	7	50	111	518	259	1850	1369	9	196	49	2500
307	46	6	32	11	70	276	1472	506	3220	2116	36	1024	121	4900
308	52	6	32	11	70	312	1664	572	3640	2704	36	1024	121	4900
309	34	3	22	7	45	102	748	238	1530	1156	9	484	49	2025
310	47	3	16	7	42	141	752	329	1974	2209	9	256	49	1764
311	44	5	30	9	65	220	1320	396	2860	1936	25	900	81	4225
312	45	5	30	9	70	225	1350	405	3150	2025	25	900	81	4900
313	44	3	34	8	60	132	1496	352	2640	1936	9	1156	64	3600

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314	37	3	34	8	60	111	1258	296	2220	1369	9	1156	64	3600
315	31	5	18	6	45	155	438	186	1395	900	25	324	36	2025
316	30	5	15	6	40	150	350	180	1200	900	25	225	36	1600
317	38	4	17	6	50	152	646	228	1900	1444	16	289	36	2500
318	30	4	15	6	46	120	450	180	1380	900	16	225	36	2116
319	40	5	25	11	42	200	1000	440	1680	1600	25	625	121	1764
320	40	5	25	11	43	200	1000	440	1800	1600	25	625	121	2025
Σ	13118 Σx_1	1515 Σx_2	7899 Σx_3	3018 Σx_4	18757 Σx_5	63190 $\Sigma x_2 x_1$	325495 $\Sigma x_3 x_1$	125166 $\Sigma x_3 x_2$	779771 $\Sigma x_4 x_1$	554691 Σx_5^2	7961 Σx_2^2	213793 Σx_3^2	31892 Σx_4^2	1144714 Σx_5^2

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